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TAKAHASHI et al.

(54) **TERMINAL FUNCTION MANAGEMENT SERVER, COMMUNICATION SYSTEM, AND COMMUNICATION METHOD**

(75) Inventors: **Masaru TAKAHASHI**, Yokosuka-shi (JP); **Atsushi Sato**, Yokohama-shi (JP)

Correspondence Address:
OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C.
1940 DUKE STREET
ALEXANDRIA, VA 22314 (US)

(73) Assignee: **NTT DoCoMo, Inc**, Chiyoda-ku (JP)

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(57) **ABSTRACT**

An object is to provide a terminal function management server, communication system, and communication method enabling efficient and smooth communication. A terminal function management server such as a DM server is configured as follows. When there is a modification of communication functions retained by a first mobile terminal **2**A, function modification information of the first mobile terminal **2**A is transmitted to second mobile terminal **2**B, **2**C associated with the first mobile terminal **2**A. As a result, when a new communication function is added to the first mobile terminal **2**A, the mobile terminal **2**B, **2**C can optionally acquire the new communication function; when a communication function is deleted from the first mobile terminal **2**A, the mobile terminal **2**B, **2**C can respond, e.g., in such a manner that it can avoid communication through the use of the communication function deleted. Therefore, it becomes feasible to implement efficient and smooth communication.

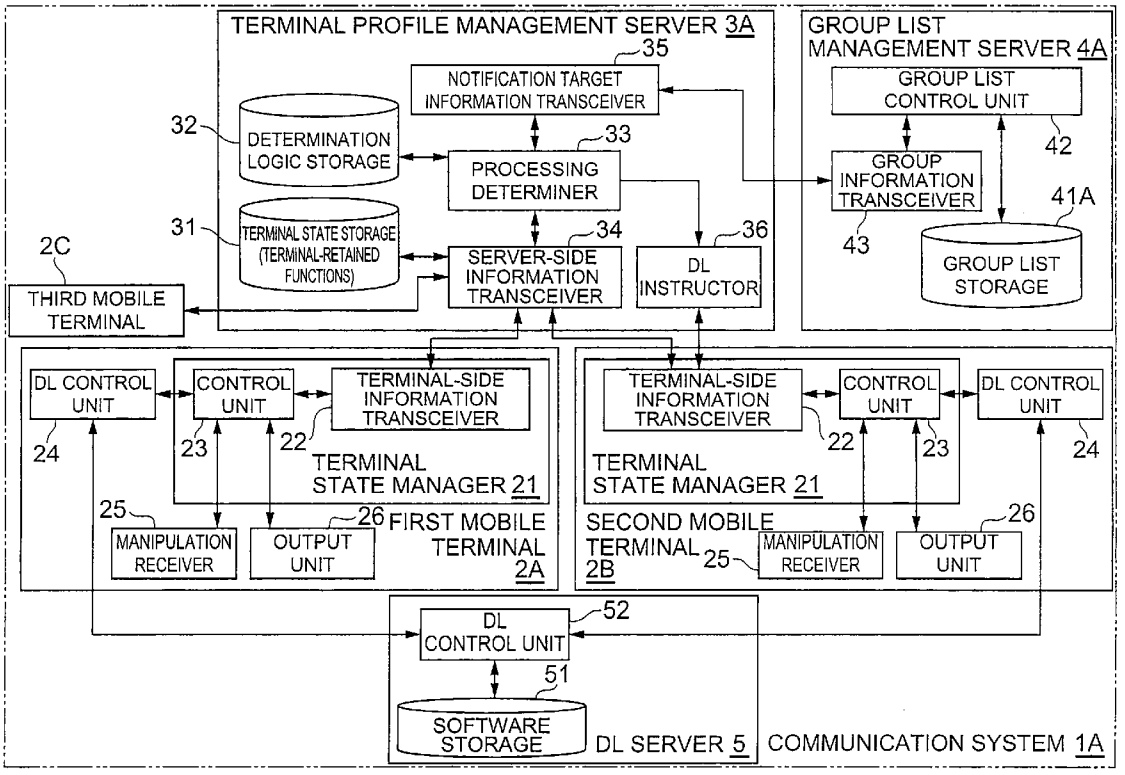


Fig.1

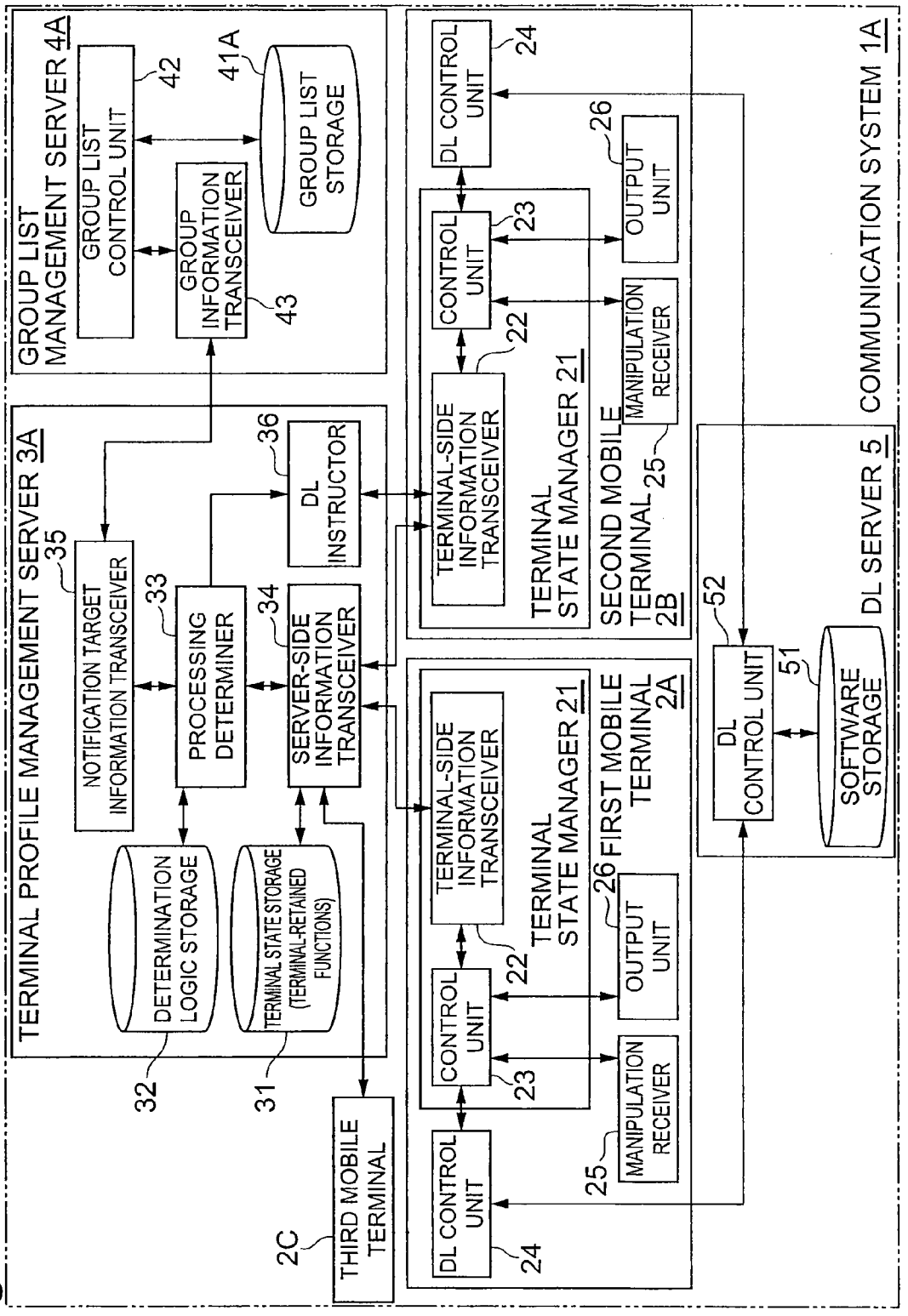
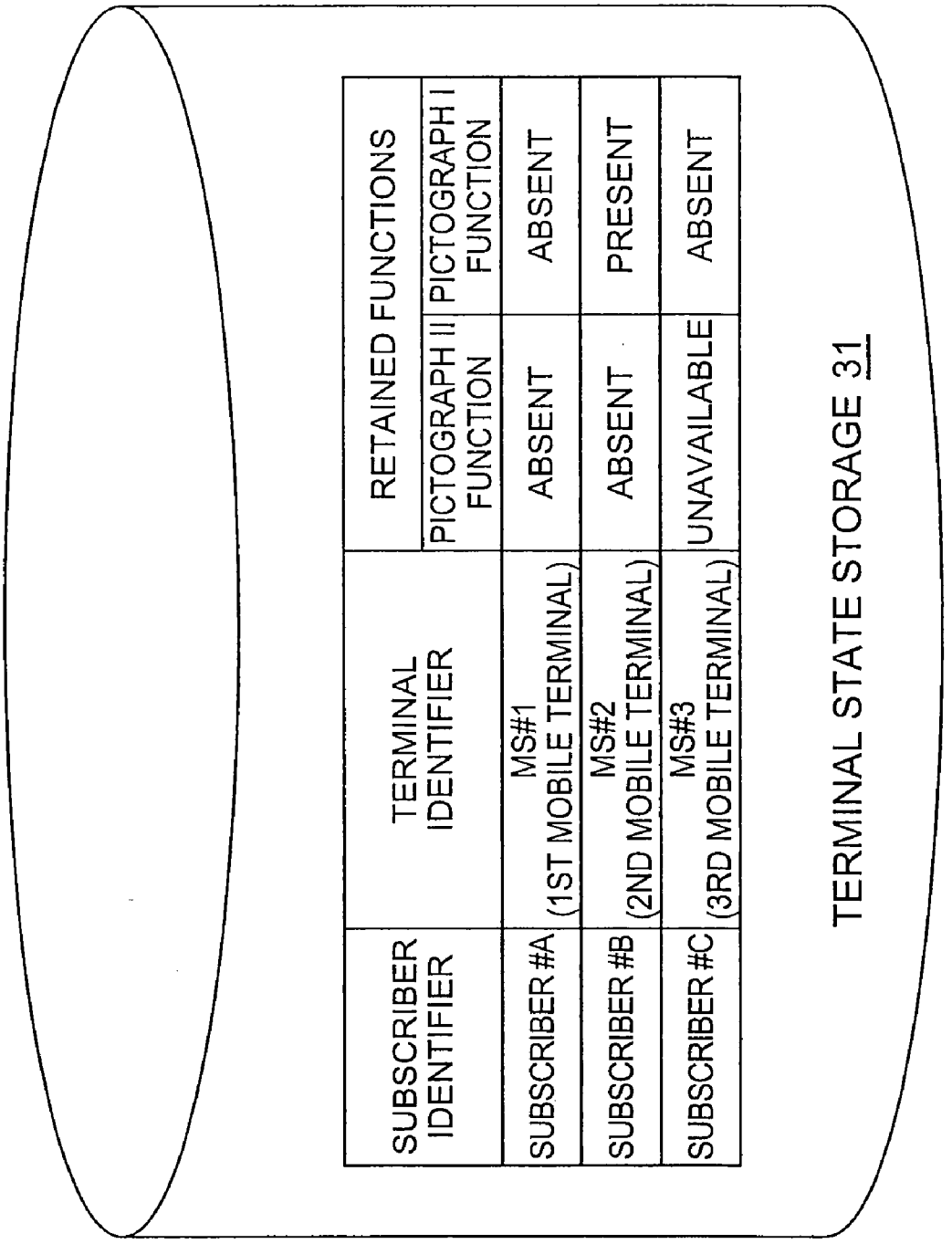

COMMUNICATION SYSTEM 1A
GROUP LIST MANAGEMENT SERVER 4A
GROUP LIST CONTROL UNIT
42
GROUP INFORMATION TRANSCEIVER
43
41A
GROUP LIST STORAGE
TERMINAL PROFILE MANAGEMENT SERVER 3A
NOTIFICATION TARGET INFORMATION TRANSCEIVER
35
PROCESSING DETERMINER
33
SERVER-SIDE INFORMATION TRANSCEIVER
34
DL INSTRUCTOR
36
DETERMINATION LOGIC STORAGE
32
TERMINAL STATE STORAGE (TERMINAL-RETAINED FUNCTIONS)
31
THIRD MOBILE TERMINAL
2C
FIRST MOBILE TERMINAL 2A
TERMINAL STATE MANAGER 21
TERMINAL-SIDE INFORMATION TRANSCEIVER
22
CONTROL UNIT
23
OUTPUT UNIT
26
MANIPULATION RECEIVER
25
DL CONTROL UNIT
24
SECOND MOBILE TERMINAL 2B
TERMINAL STATE MANAGER 21
TERMINAL-SIDE INFORMATION TRANSCEIVER
22
CONTROL UNIT
23
OUTPUT UNIT
26
MANIPULATION RECEIVER
25
DL CONTROL UNIT
24
DL SERVER 5
DL CONTROL UNIT
52
SOFTWARE STORAGE
51

Fig.2



SUBSCRIBER IDENTIFIER	TERMINAL IDENTIFIER	RETAINED FUNCTIONS	
		PICTOGRAPH II FUNCTION	PICTOGRAPH I FUNCTION
SUBSCRIBER #A	MS#1 (1ST MOBILE TERMINAL)	ABSENT	ABSENT
SUBSCRIBER #B	MS#2 (2ND MOBILE TERMINAL)	ABSENT	PRESENT
SUBSCRIBER #C	MS#3 (3RD MOBILE TERMINAL)	UNAVAILABLE	ABSENT

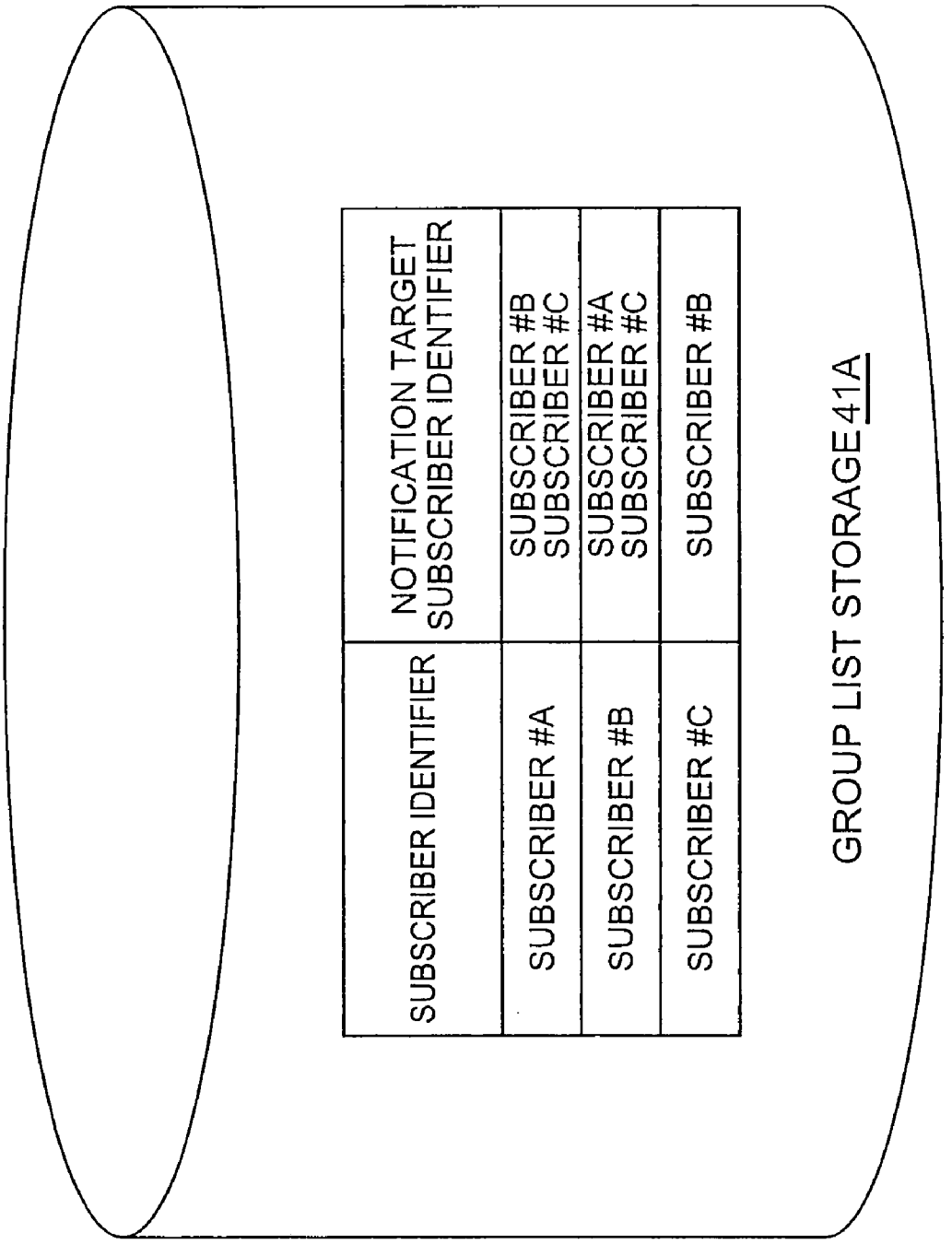

GROUP LIST STORAGE 41A
SUBSCRIBER IDENTIFIER
NOTIFICATION TARGET SUBSCRIBER IDENTIFIER
SUBSCRIBER #A
SUBSCRIBER #B #C
SUBSCRIBER #B
SUBSCRIBER #A #C
SUBSCRIBER #C
SUBSCRIBER #B

Fig.3

Fig.4

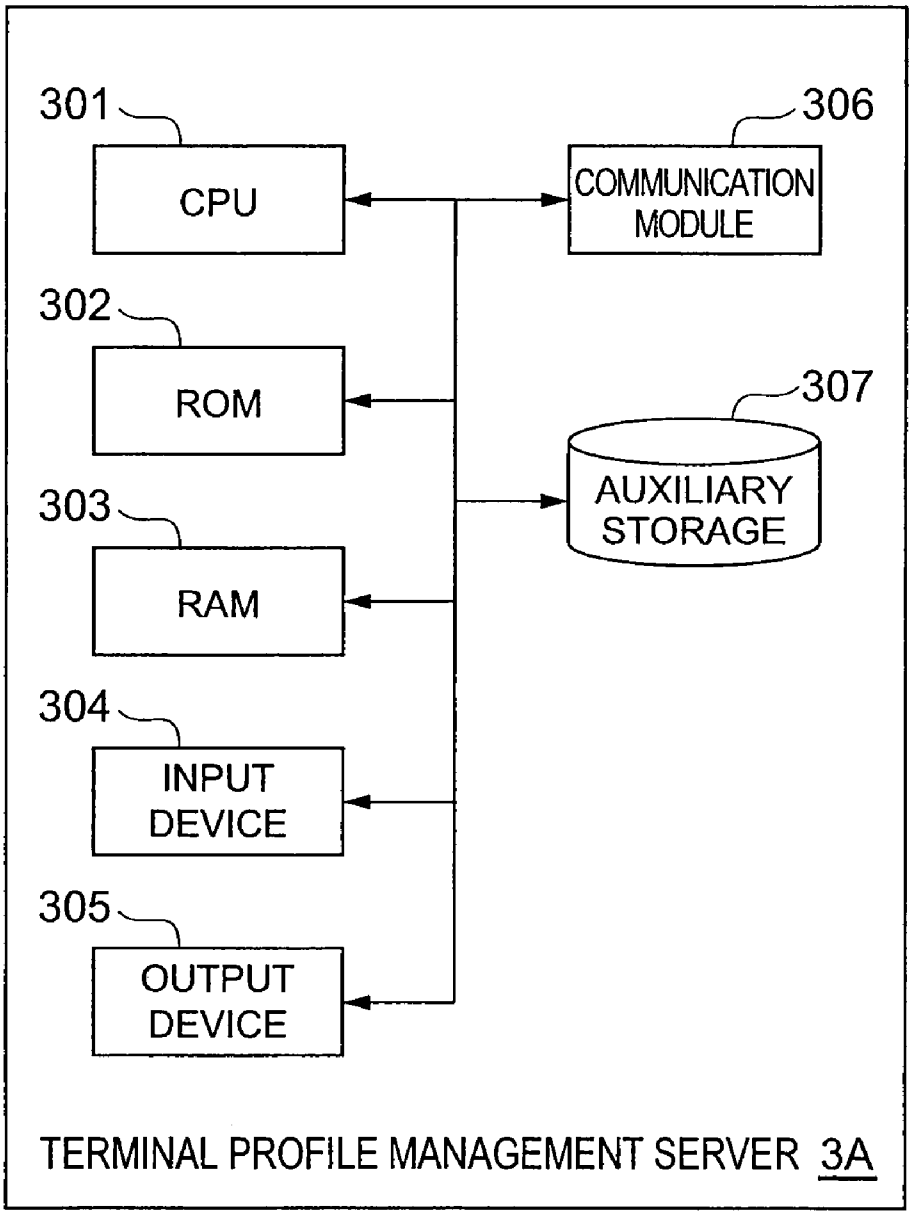

301
CPU
306
COMMUNICATION MODULE
302
ROM
307
AUXILIARY STORAGE
303
RAM
304
INPUT DEVICE
305
OUTPUT DEVICE
TERMINAL PROFILE MANAGEMENT SERVER 3A

Fig.5

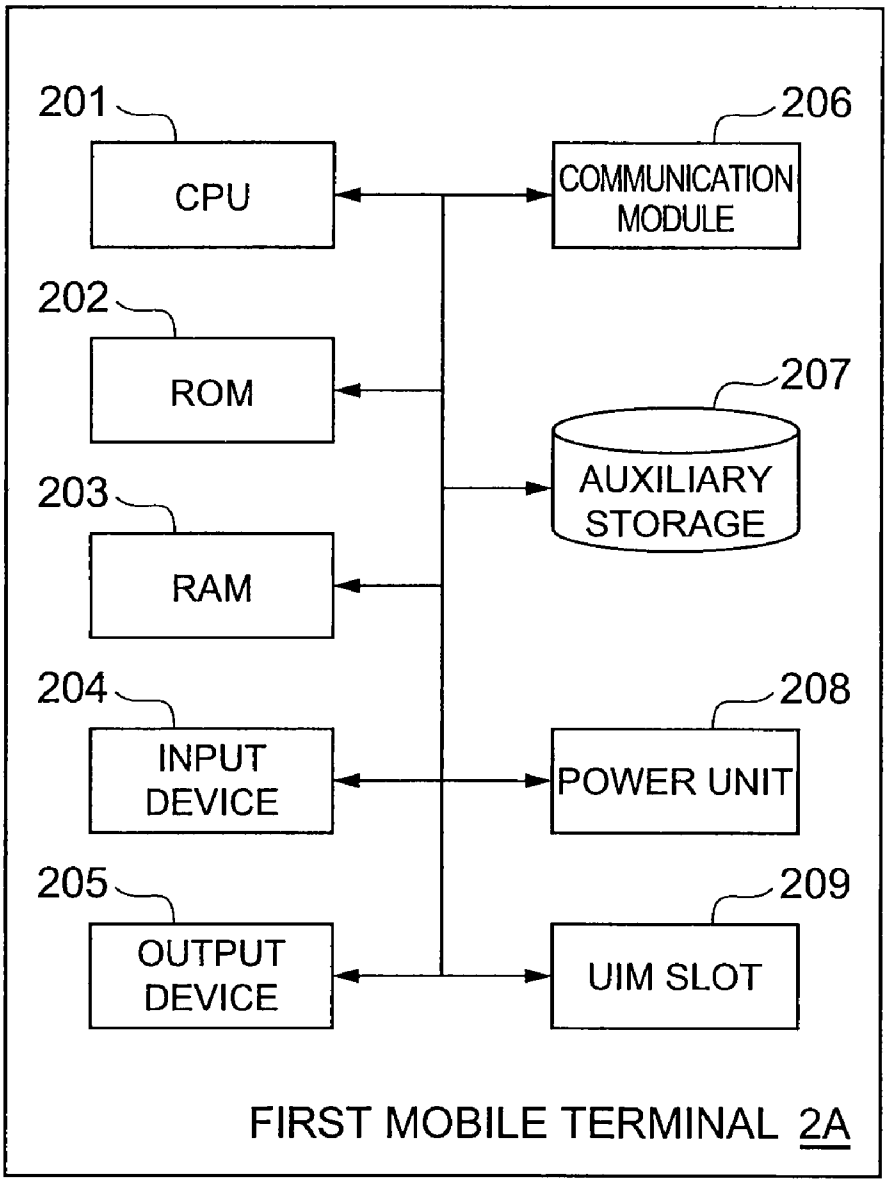

201
CPU
202
ROM
203
RAM
204
INPUT DEVICE
205
OUTPUT DEVICE
206
COMMUNICATION MODULE
207
AUXILIARY STORAGE
208
POWER UNIT
209
UIM SLOT
FIRST MOBILE TERMINAL 2A

Fig.6

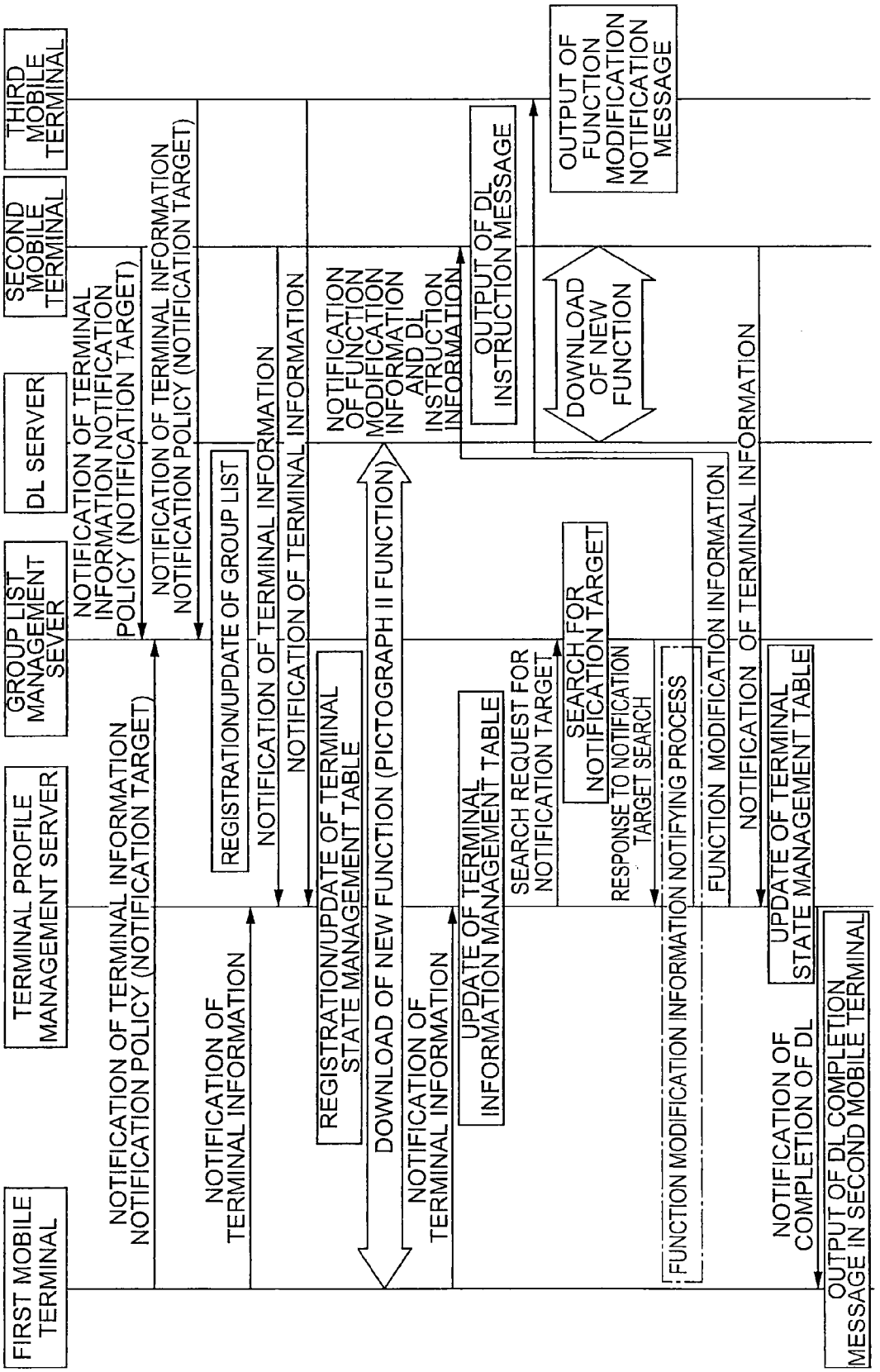

FIRST MOBILE TERMINAL
TERMINAL PROFILE MANAGEMENT SERVER
GROUP LIST MANAGEMENT SEVER
DL SERVER
SECOND MOBILE TERMINAL
THIRD MOBILE TERMINAL
NOTIFICATION OF TERMINAL INFORMATION NOTIFICATION POLICY (NOTIFICATION TARGET)
NOTIFICATION OF TERMINAL INFORMATION NOTIFICATION POLICY (NOTIFICATION TARGET)
NOTIFICATION OF TERMINAL INFORMATION NOTIFICATION TARGET)
REGISTRATION/UPDATE OF GROUP LIST
NOTIFICATION OF TERMINAL INFORMATION
NOTIFICATION OF TERMINAL INFORMATION
REGISTRATION/UPDATE OF TERMINAL STATE MANAGEMENT TABLE
DOWNLOAD OF NEW FUNCTION (PICTOGRAPH II FUNCTION)
NOTIFICATION OF FUNCTION MODIFICATION INFORMATION AND DL INSTRUCTION INFORMATION
OUTPUT OF DL INSTRUCTION MESSAGE
OUTPUT OF FUNCTION MODIFICATION NOTIFICATION MESSAGE
DOWNLOAD OF NEW FUNCTION
NOTIFICATION OF TERMINAL INFORMATION
UPDATE OF TERMINAL INFORMATION MANAGEMENT TABLE
SEARCH REQUEST FOR NOTIFICATION TARGET
SEARCH FOR NOTIFICATION TARGET
RESPONSE TO NOTIFICATION TARGET SEARCH
FUNCTION MODIFICATION INFORMATION NOTIFYING PROCESS
FUNCTION MODIFICATION INFORMATION
NOTIFICATION OF TERMINAL INFORMATION
UPDATE OF TERMINAL STATE MANAGEMENT TABLE
NOTIFICATION OF COMPLETION OF DL
OUTPUT OF DL COMPLETION MESSAGE IN SECOND MOBILE TERMINAL

Fig.7

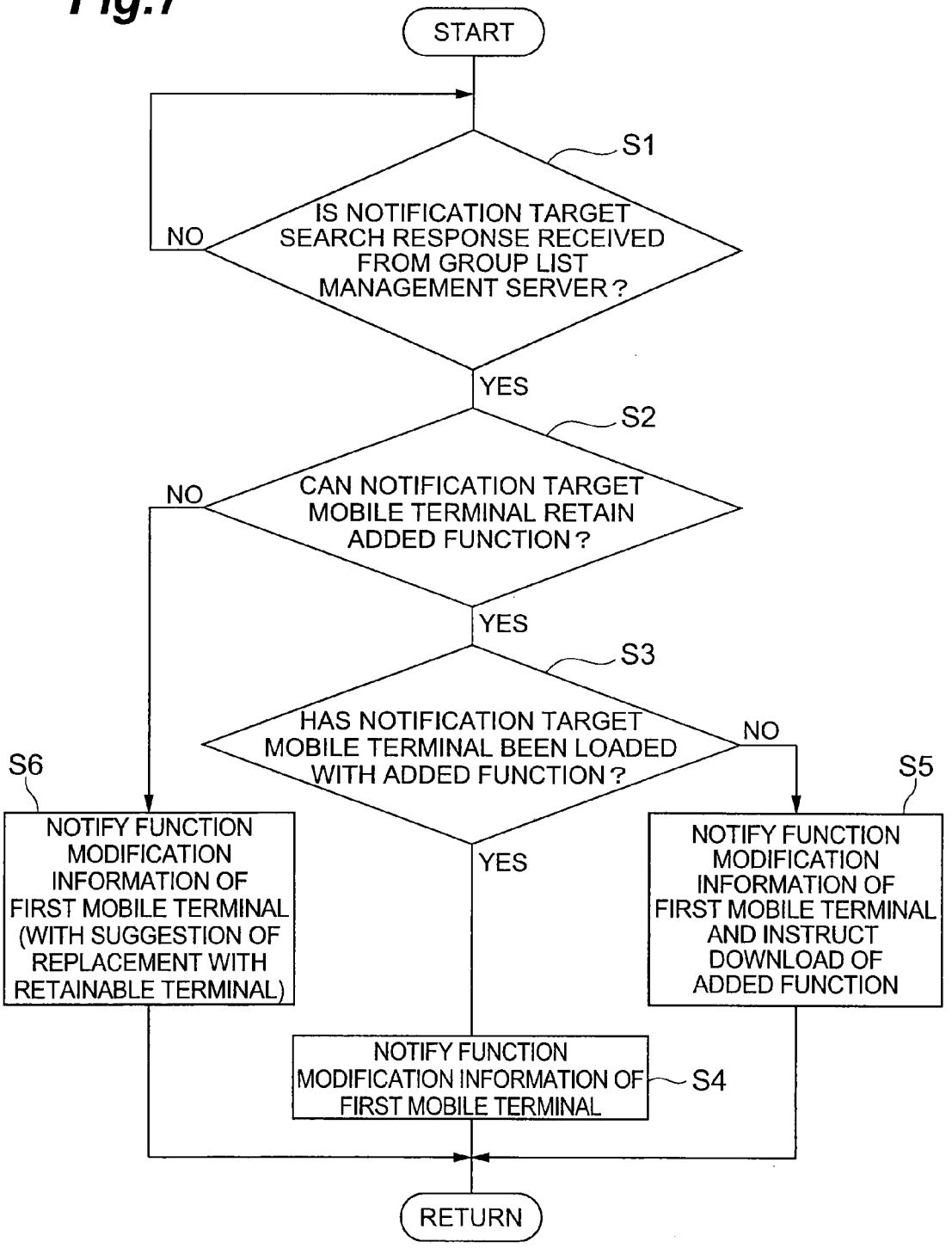
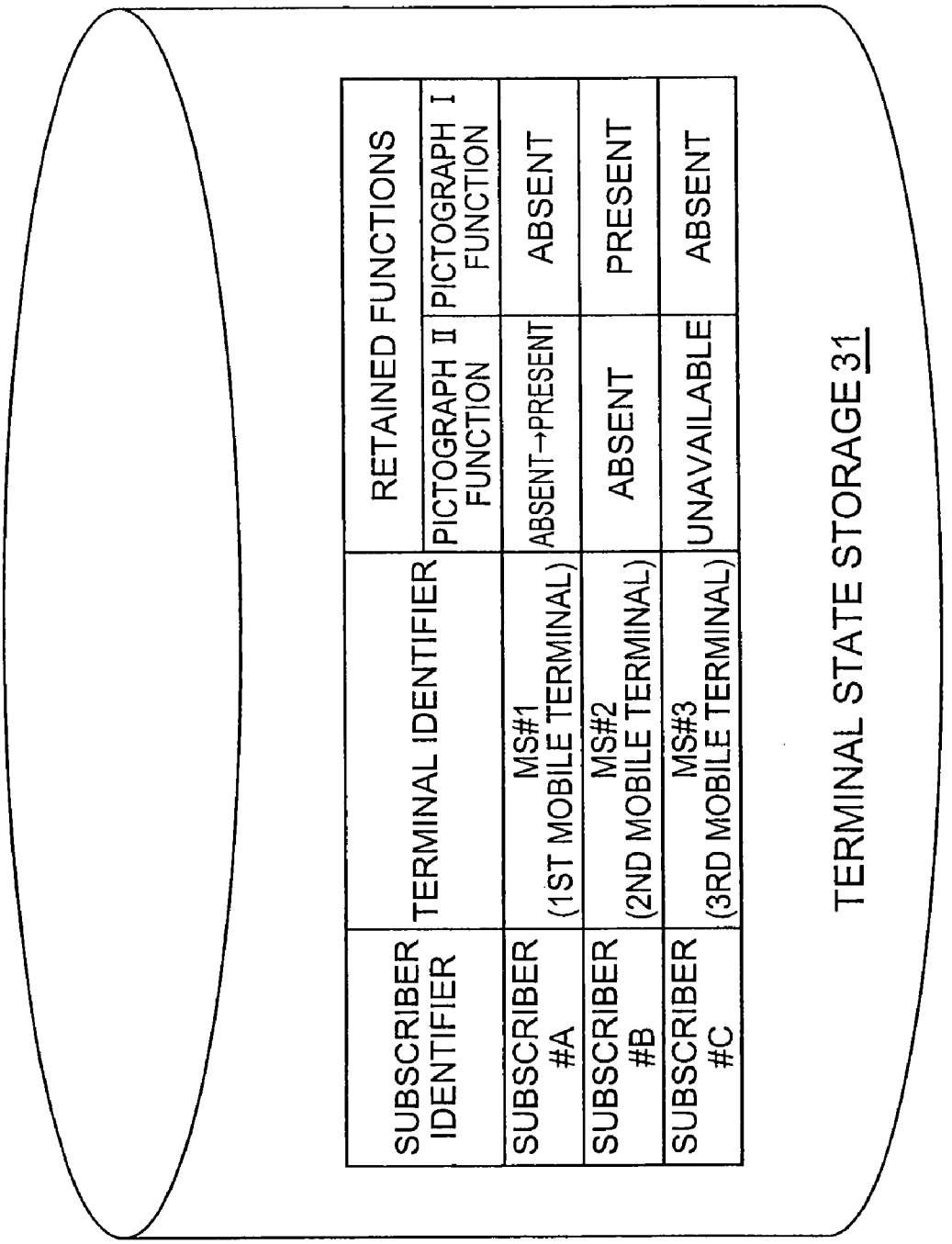

START
S1
IS NOTIFICATION TARGET SEARCH RESPONSE RECEIVED FROM GROUP LIST MANAGEMENT SERVER?
NO
YES
S2
CAN NOTIFICATION TARGET MOBILE TERMINAL RETAIN ADDED FUNCTION?
NO
YES
S3
HAS NOTIFICATION TARGET MOBILE TERMINAL BEEN LOADED WITH ADDED FUNCTION?
NO
YES
S6
NOTIFY FUNCTION MODIFICATION INFORMATION OF FIRST MOBILE TERMINAL (WITH SUGGESTION OF REPLACEMENT WITH RETAINABLE TERMINAL)
S5
NOTIFY FUNCTION MODIFICATION INFORMATION OF FIRST MOBILE TERMINAL AND INSTRUCT DOWNLOAD OF ADDED FUNCTION
NOTIFY FUNCTION MODIFICATION INFORMATION OF FIRST MOBILE TERMINAL
S4
RETURN

Fig.8


TERMINAL STATE STORAGE 31
SUBSCRIBER IDENTIFIER
TERMINAL IDENTIFIER
RETAINED FUNCTIONS
PICTOGRAPH II FUNCTION
PICTOGRAPH I FUNCTION
SUBSCRIBER #A
MS#1 (1ST MOBILE TERMINAL)
ABSENT→PRESENT
ABSENT
SUBSCRIBER #B
MS#2 (2ND MOBILE TERMINAL)
ABSENT
PRESENT
SUBSCRIBER #C
MS#3 (3RD MOBILE TERMINAL)
UNAVAILABLE
ABSENT

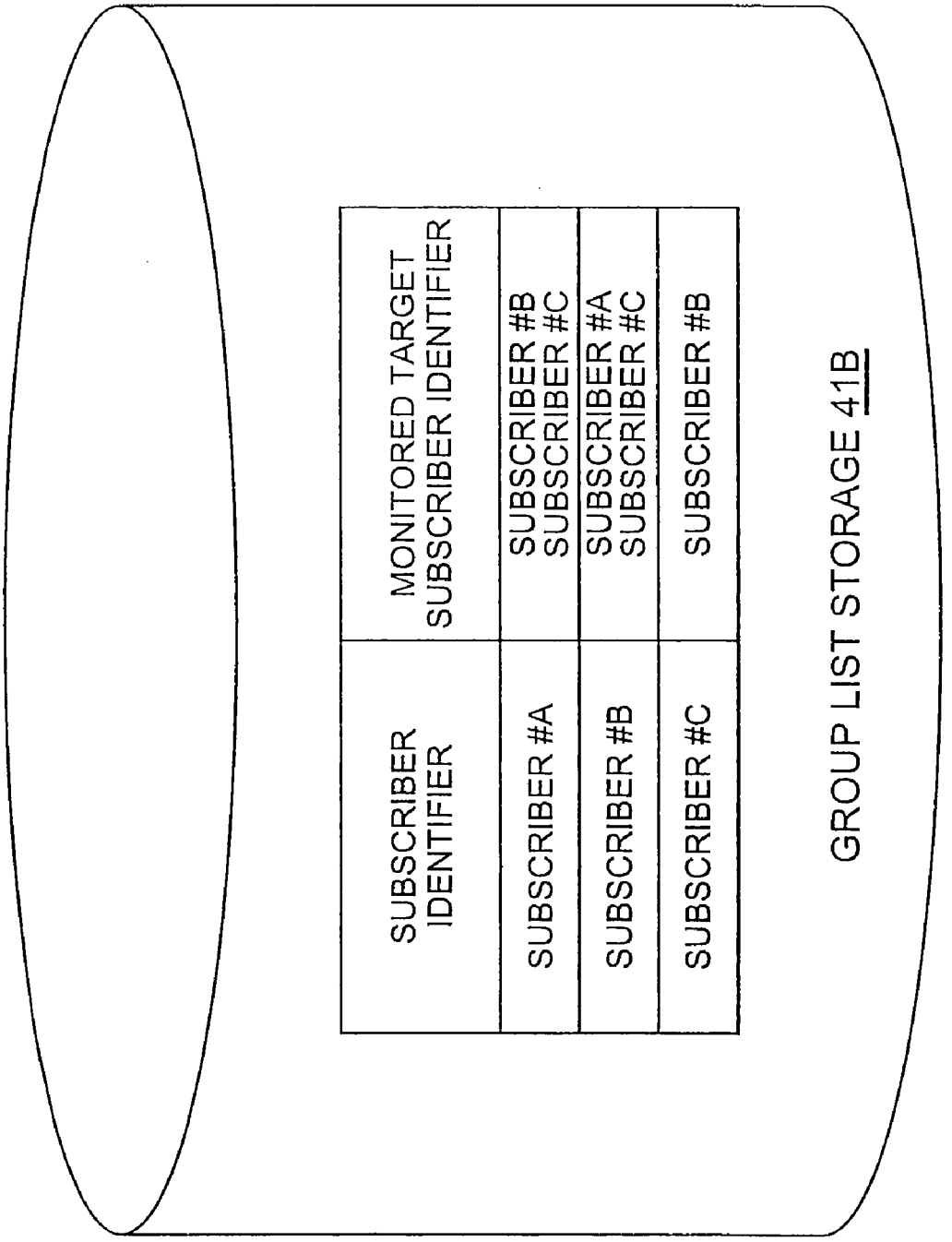

GROUP LIST STORAGE 41B
SUBSCRIBER IDENTIFIER
MONITORED TARGET SUBSCRIBER IDENTIFIER
SUBSCRIBER #A
SUBSCRIBER #B SUBSCRIBER #C
SUBSCRIBER #B
SUBSCRIBER #A SUBSCRIBER #C
SUBSCRIBER #C
SUBSCRIBER #B

Fig.9

Fig.10

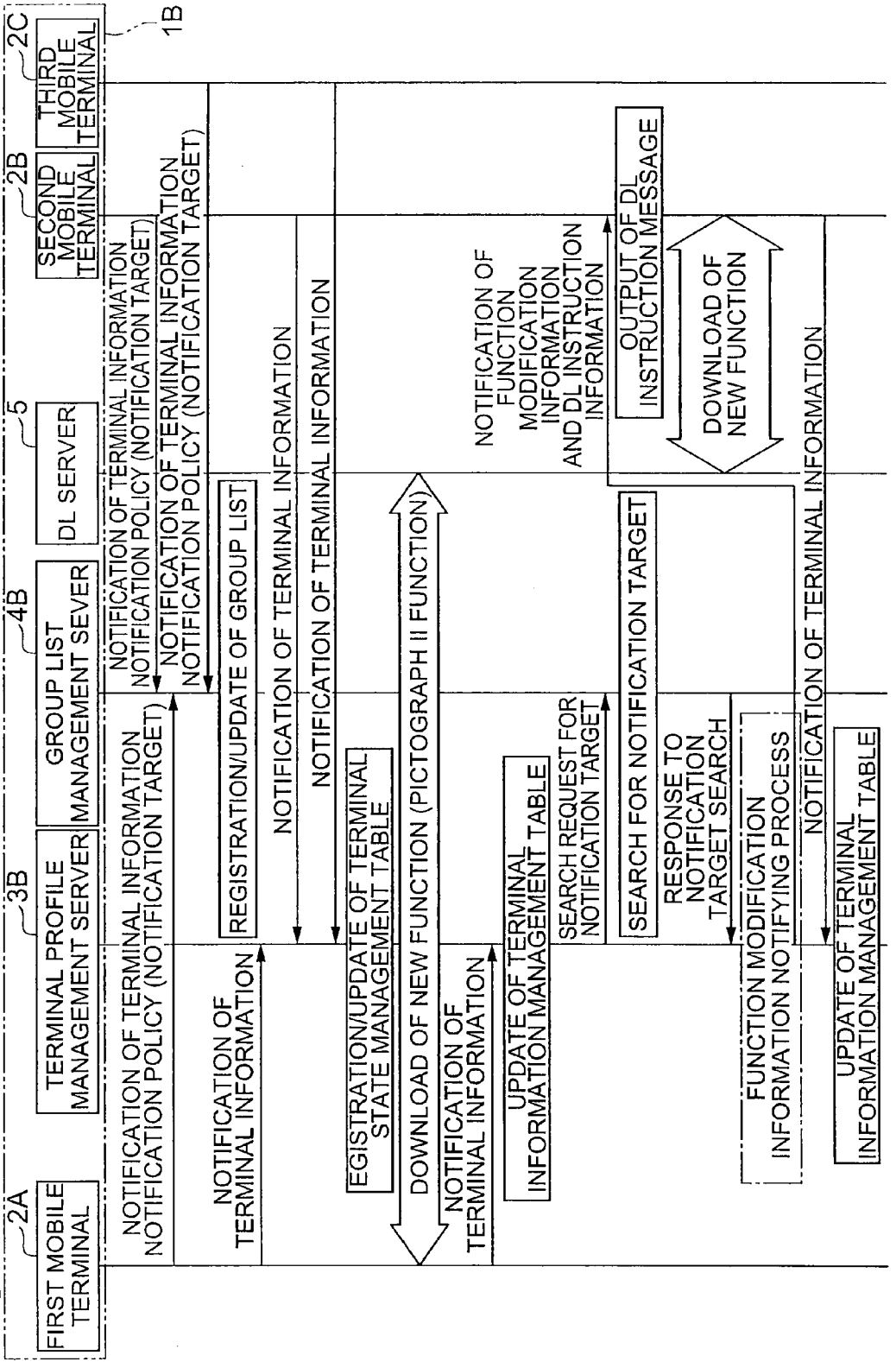

2A
FIRST MOBILE TERMINAL
3B
TERMINAL PROFILE MANAGEMENT SERVER
4B
GROUP LIST MANAGEMENT SEVER
5
DL SERVER
2B
SECOND MOBILE TERMINAL
2C
THIRD MOBILE TERMINAL
1B
NOTIFICATION OF TERMINAL INFORMATION NOTIFICATION POLICY (NOTIFICATION TARGET)
NOTIFICATION OF TERMINAL INFORMATION NOTIFICATION POLICY (NOTIFICATION TARGET)
NOTIFICATION OF TERMINAL INFORMATION NOTIFICATION TARGET
REGISTRATION/UPDATE OF GROUP LIST
NOTIFICATION OF TERMINAL INFORMATION
NOTIFICATION OF TERMINAL INFORMATION
EGISTRATION/UPDATE OF TERMINAL STATE MANAGEMENT TABLE
DOWNLOAD OF NEW FUNCTION (PICTOGRAPH II FUNCTION)
NOTIFICATION OF FUNCTION MODIFICATION INFORMATION AND DL INSTRUCTION INFORMATION
OUTPUT OF DL INSTRUCTION MESSAGE
DOWNLOAD OF NEW FUNCTION
NOTIFICATION OF TERMINAL INFORMATION
NOTIFICATION OF TERMINAL INFORMATION
UPDATE OF TERMINAL INFORMATION MANAGEMENT TABLE
SEARCH REQUEST FOR NOTIFICATION TARGET
SEARCH FOR NOTIFICATION TARGET
RESPONSE TO NOTIFICATION TARGET SEARCH
FUNCTION MODIFICATION INFORMATION NOTIFYING PROCESS
NOTIFICATION OF TERMINAL INFORMATION
UPDATE OF TERMINAL INFORMATION MANAGEMENT TABLE

Fig.11

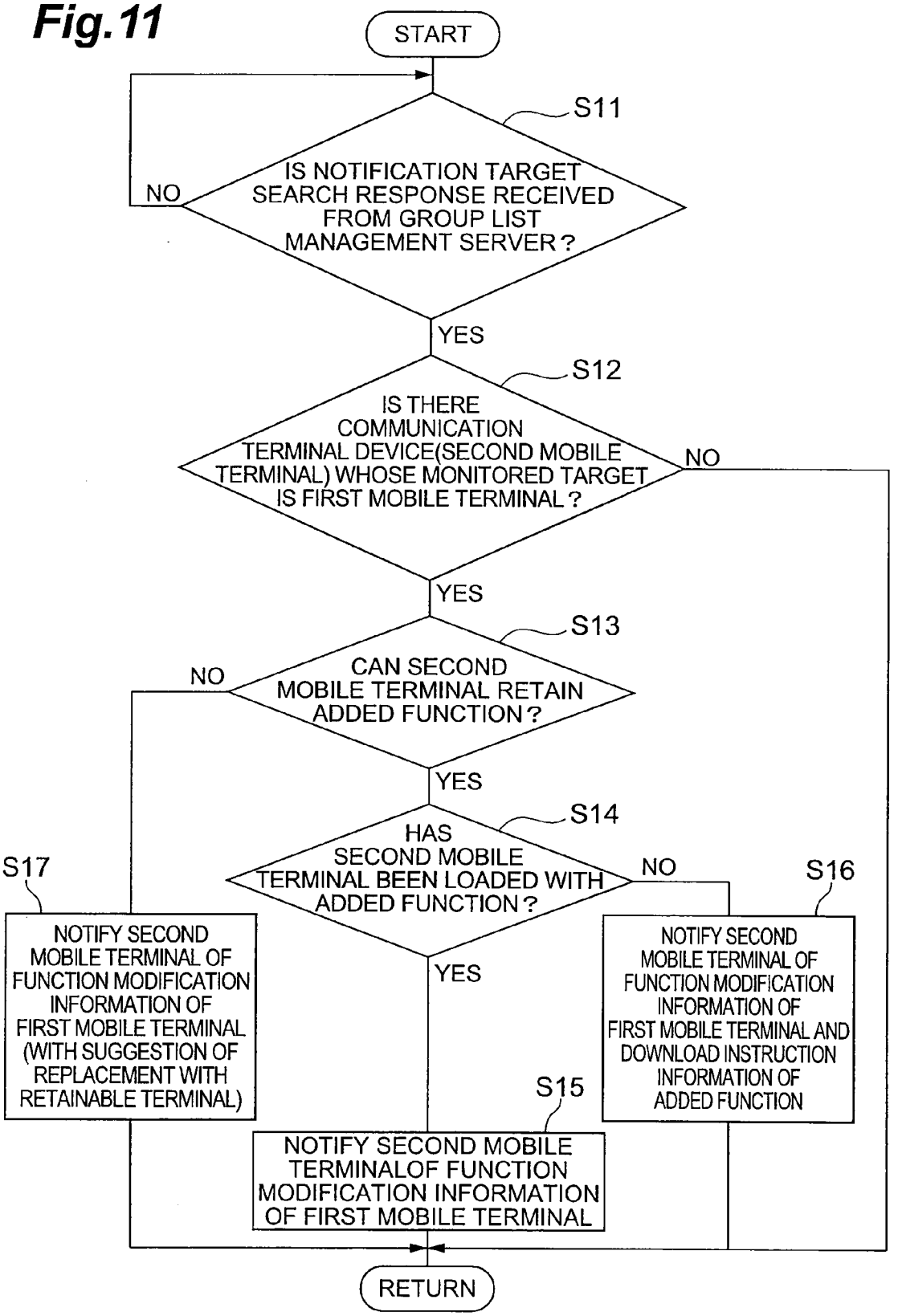

START
S11
IS NOTIFICATION TARGET SEARCH RESPONSE RECEIVED FROM GROUP LIST MANAGEMENT SERVER?
NO
YES
S12
IS THERE COMMUNICATION TERMINAL DEVICE(SECOND MOBILE TERMINAL) WHOSE MONITORED TARGET IS FIRST MOBILE TERMINAL?
NO
YES
S13
CAN SECOND MOBILE TERMINAL RETAIN ADDED FUNCTION?
NO
YES
S14
HAS SECOND MOBILE TERMINAL BEEN LOADED WITH ADDED FUNCTION?
NO
YES
S17
NOTIFY SECOND MOBILE TERMINAL OF FUNCTION MODIFICATION INFORMATION OF FIRST MOBILE TERMINAL (WITH SUGGESTION OF REPLACEMENT WITH RETAINABLE TERMINAL)
S16
NOTIFY SECOND MOBILE TERMINAL OF FUNCTION MODIFICATION INFORMATION OF FIRST MOBILE TERMINAL AND DOWNLOAD INSTRUCTION INFORMATION OF ADDED FUNCTION
S15
NOTIFY SECOND MOBILE TERMINALOF FUNCTION MODIFICATION INFORMATION OF FIRST MOBILE TERMINAL
RETURN

Fig.12

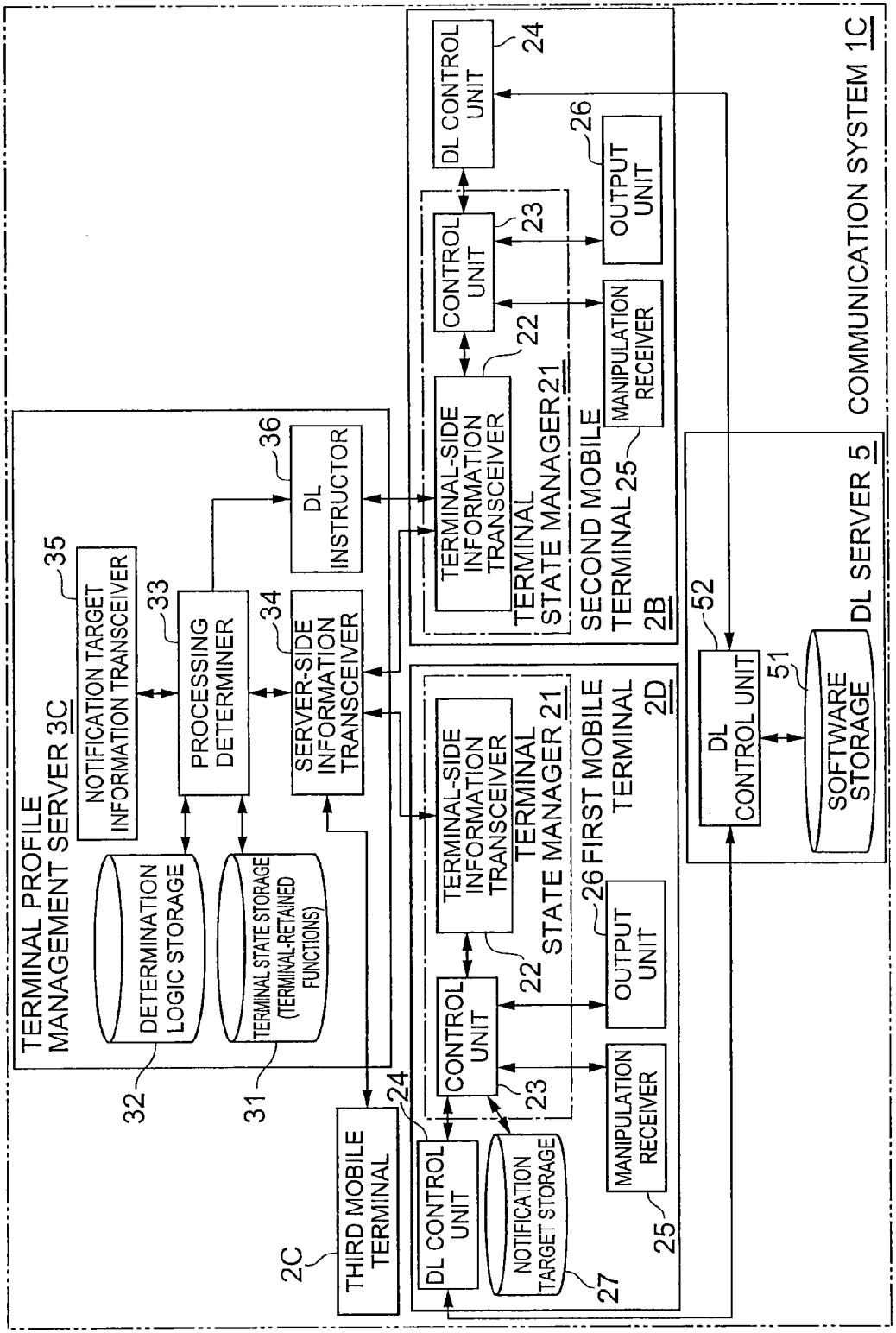

COMMUNICATION SYSTEM 1C
TERMINAL PROFILE MANAGEMENT SERVER 3C
NOTIFICATION TARGET INFORMATION TRANSCEIVER
35
PROCESSING DETERMINER
33
DETERMINATION LOGIC STORAGE
32
TERMINAL STATE STORAGE (TERMINAL-RETAINED FUNCTIONS)
31
SERVER-SIDE INFORMATION TRANSCEIVER
34
DL INSTRUCTOR
36
THIRD MOBILE TERMINAL
2C
DL CONTROL UNIT
24
NOTIFICATION TARGET STORAGE
27
CONTROL UNIT
23
TERMINAL-SIDE INFORMATION TRANSCEIVER
22
TERMINAL STATE MANAGER 21
OUTPUT UNIT
26
MANIPULATION RECEIVER
25
FIRST MOBILE TERMINAL 2D
SECOND MOBILE TERMINAL 2B
DL SERVER 5
DL CONTROL UNIT
52
SOFTWARE STORAGE
51

Fig.13

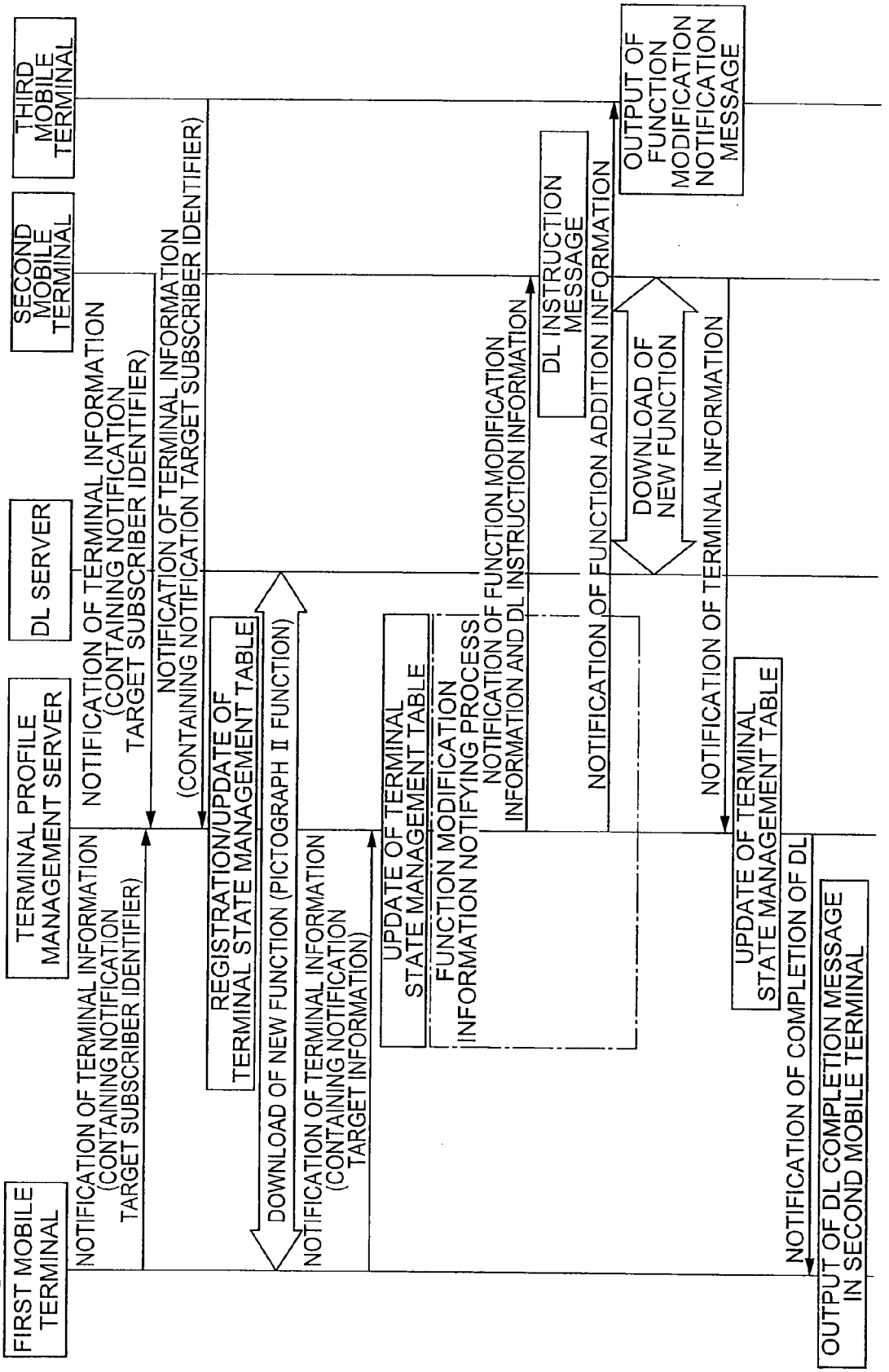
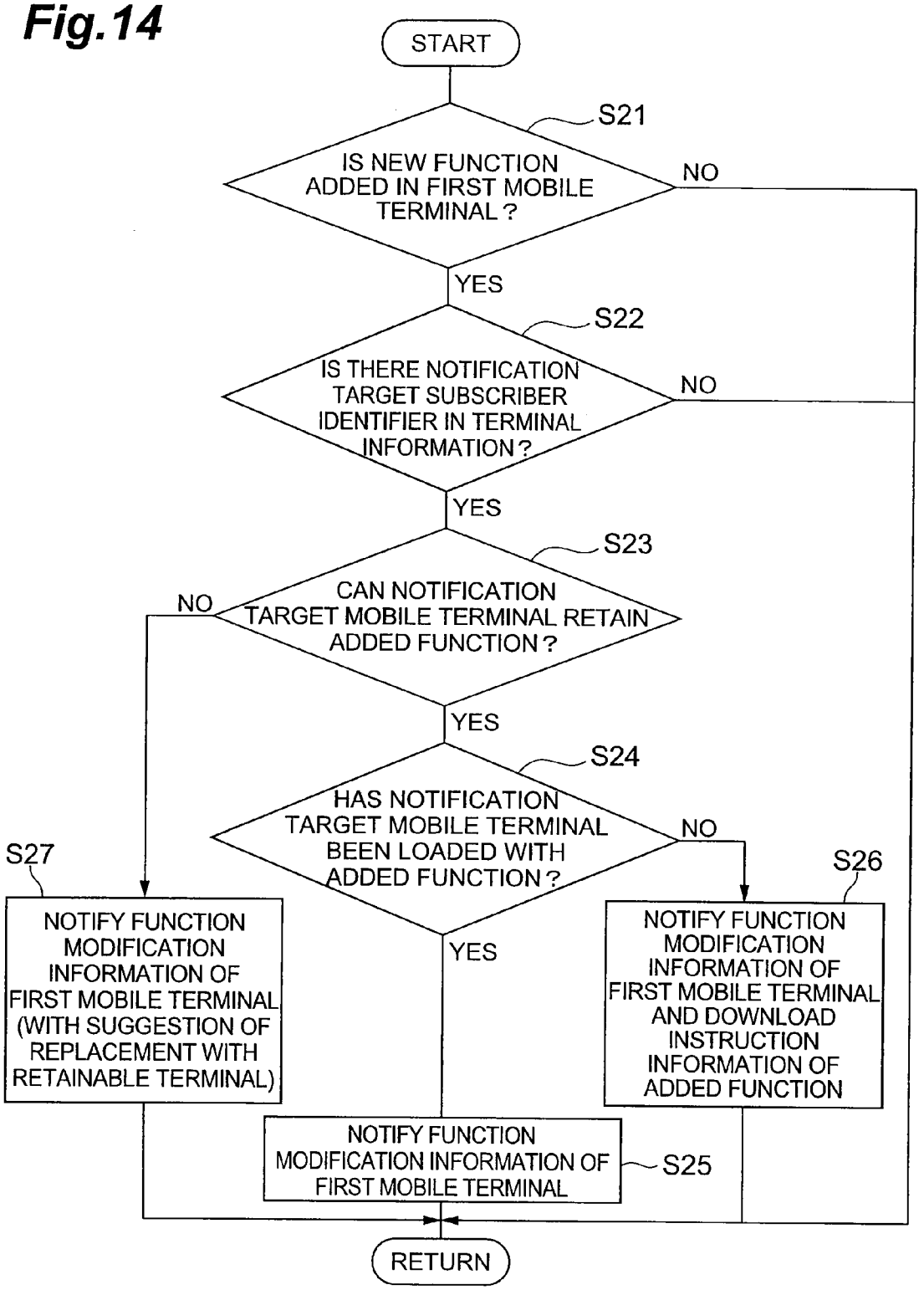

FIRST MOBILE TERMINAL
TERMINAL PROFILE MANAGEMENT SERVER
DL SERVER
SECOND MOBILE TERMINAL
THIRD MOBILE TERMINAL
NOTIFICATION OF TERMINAL INFORMATION (CONTAINING NOTIFICATION TARGET SUBSCRIBER IDENTIFIER)
NOTIFICATION OF TERMINAL INFORMATION (CONTAINING NOTIFICATION TARGET SUBSCRIBER IDENTIFIER)
REGISTRATION/UPDATE OF TERMINAL STATE MANAGEMENT TABLE
DOWNLOAD OF NEW FUNCTION (PICTOGRAPH II FUNCTION)
NOTIFICATION OF TERMINAL INFORMATION (CONTAINING NOTIFICATION TARGET INFORMATION)
UPDATE OF TERMINAL STATE MANAGEMENT TABLE
FUNCTION MODIFICATION INFORMATION NOTIFYING PROCESS
NOTIFICATION OF FUNCTION MODIFICATION INFORMATION AND DL INSTRUCTION INFORMATION
DL INSTRUCTION MESSAGE
NOTIFICATION OF FUNCTION ADDITION INFORMATION
OUTPUT OF FUNCTION MODIFICATION NOTIFICATION MESSAGE
DOWNLOAD OF NEW FUNCTION
NOTIFICATION OF TERMINAL INFORMATION
NOTIFICATION OF TERMINAL STATE MANAGEMENT TABLE
UPDATE OF TERMINAL STATE MANAGEMENT TABLE
NOTIFICATION OF COMPLETION OF DL
OUTPUT OF DL COMPLETION MESSAGE IN SECOND MOBILE TERMINAL

Fig.14


START
S21
IS NEW FUNCTION ADDED IN FIRST MOBILE TERMINAL?
NO
YES
S22
IS THERE NOTIFICATION TARGET SUBSCRIBER IDENTIFIER IN TERMINAL INFORMATION?
NO
YES
S23
CAN NOTIFICATION TARGET MOBILE TERMINAL RETAIN ADDED FUNCTION?
NO
YES
S24
HAS NOTIFICATION TARGET MOBILE TERMINAL BEEN LOADED WITH ADDED FUNCTION?
NO
YES
S27
NOTIFY FUNCTION MODIFICATION INFORMATION OF FIRST MOBILE TERMINAL (WITH SUGGESTION OF REPLACEMENT WITH RETAINABLE TERMINAL)
S26
NOTIFY FUNCTION MODIFICATION INFORMATION OF FIRST MOBILE TERMINAL AND DOWNLOAD INSTRUCTION INFORMATION OF ADDED FUNCTION
NOTIFY FUNCTION MODIFICATION INFORMATION OF FIRST MOBILE TERMINAL
S25
RETURN

TERMINAL FUNCTION MANAGEMENT SERVER, COMMUNICATION SYSTEM, AND COMMUNICATION METHOD

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a terminal function management server such as a DM (Device Management) server for managing communication functions retained by communication terminal devices, a communication system incorporating the terminal function management server, and a communication method therein.

[0003] 2. Related Background Art

[0004] Recently, DM (Device Management) to manage device information of communication terminal devices has been standardized by OMA (Open Mobile Alliance). There is a known system to provide, for example, a service like a remote diagnosis of a communication terminal device such as a cell phone, or like a remote DL (Down Load) through the use of a DM server to realize DM. There is also a known system such as a content delivery system to deliver a ringing melody from a Web server to a communication terminal device in response to a request for the ringing melody from the communication terminal device (cf. Patent Document 1).

[0005] [Patent Document 1] Japanese Patent Application Laid-open No. 2005-157912

SUMMARY OF THE INVENTION

[0006] With the conventional systems, however, even if there is a communication function modification of a communication terminal device used by another user and if there is no notification from the other user, it was difficult to know which communication function was downloaded in the communication terminal device of the other user or deleted from the communication terminal device. For this reason, it was difficult to preliminarily acquire and prepare the new communication function prior to a communication request from the other user, and if the other user should have deleted a certain communication function, a communication request using the deleted communication function would be rejected and this could impede efficient and smooth communication.

[0007] An object of the present invention is therefore to provide a terminal function management server, a communication system, and a communication method enabling efficient and smooth communication.

[0008] In order to solve the above-described problem, the present invention provides a terminal function management server which stores a communication function retained by a communication terminal device, out of a plurality of communication functions to enable a plurality of communications of different communication modes, the terminal function management server comprising: terminal function storing means to store one or more communication functions retained by each communication terminal device of the plurality of communication terminal devices, in correspondence to the communication terminal device; and processing determining means to receive communication function retention information transmitted from the communication terminal device and to modify the communication functions stored in the terminal function storing means, based on the communication function retention information, wherein the processing determining means, when modifying the communication functions stored in correspondence to a first communication terminal device out of the plurality of communication terminal devices, in the terminal function storing means, transmits function modification information indicating the modification of the communication functions of the first communication terminal device, to a second communication terminal device associated with the first communication terminal device.

[0009] The terminal function management server according to the present invention is configured as follows. The terminal function management server manages the communication functions retained by the respective communication terminal devices, and if there is a modification of the communication functions retained by a first communication terminal device, the communication functions stored in correspondence to the first communication terminal device in the terminal function storing means are modified based on the communication function retention information transmitted from the first communication terminal device. Furthermore, in accordance with the modification of the communication functions retained by the first communication terminal device, the processing determining means transmits the function modification information indicating the modification of the communication functions of the first communication terminal device, to a second communication terminal device associated with the first communication terminal device, whereby the second communication terminal device can acquire the function modification information of the first communication terminal device. In accordance with the content of the function modification of the first communication terminal device, a user of the second communication terminal device can optionally acquire a new communication function, for example, if the new communication function is added; or, if a communication function is deleted, the user can respond, for example, in such a manner that the user can avoid a communication through the use of the communication function deleted or the like. As a result, it becomes feasible to implement efficient and smooth communication.

[0010] Furthermore, preferably, the processing determining means specifies the second communication terminal device, based on identification information acquired from group information storing means storing the identification information of the second communication terminal device associated with the first terminal communication device, and transmits the function modification information to the second communication terminal device thus specified. This configuration permits the group information storing means to perform integrated management of the identification information of the second communication terminal device associated with each of the communication terminal devices, and thus facilitates modification and addition.

[0011] Furthermore, preferably, the communication function retention information contains identification information of the second communication terminal device associated with the first communication terminal device, and the processing determining means specifies the second communication terminal device, based on the identification information contained in the communication function retention information, and transmits the function modification information to the second communication terminal device thus specified. A modification of the communication functions stored in association with the first communication terminal device in the terminal function storing means is executed based on the communication function retention information from the first communication terminal device. Since the communication

function retention information contains the identification information of the second communication terminal device, the identification information of the second communication terminal device can be acquired in accordance with the acquisition of the communication function retention information and thus the second communication terminal device can be specified from the identification information.

[0012] Furthermore, preferably, when the communication functions stored in the terminal function storing means are modified by adding a new communication function in correspondence to the first communication terminal device, the processing determining means determines whether the second communication terminal device retains the new communication function; the terminal function management server further comprises download instructing means to transmit download instruction information to instruct a download of the new communication function, to the second communication terminal device determined not to retain the new communication function, by the processing determining means. When the second communication terminal device without the new communication function acquires the download instruction information of the new communication function, it can readily acquire the new communication function corresponding to the communication function acquired by the first communication terminal device.

[0013] Furthermore, preferably, the terminal function storing means further stores a communication function which the communication terminal device can retain; when the communication functions stored in the terminal function storing means are modified by adding a new communication function in correspondence to the first communication terminal device, the processing determining means determines whether the second communication terminal device can retain the new communication function; the terminal function management server further comprises download instructing means to transmit download instruction information to instruct a download of the new communication function, to the second communication terminal device determined to be able to retain the new communication function, by the processing determining means. If the second communication terminal device cannot retain the new communication function, it is substantially worthless to transmit the download instruction information. Since the download instruction information is transmitted only if the second communication terminal device can retain the new communication function, the second communication terminal device can efficiently acquire the new communication function.

[0014] The present invention also provides a communication system comprising a terminal function management server which stores a communication function retained by a communication terminal device, out of a plurality of communication functions to enable a plurality of communications of different communication modes, wherein the terminal function management server comprises: terminal function storing means to store one or more communication functions retained by each communication terminal device of the plurality of communication terminal devices, in correspondence to the communication terminal device; and processing determining means to receive communication function retention information transmitted from the communication terminal device and to modify the communication functions stored in the terminal function storing means, based on the communication function retention information, wherein the processing determining means, when modifying the communication functions stored in correspondence to a first communication terminal device out of the plurality of communication terminal devices, in the terminal function storing means, transmits function modification information indicating the modification of the communication functions of the first communication terminal device, to a second communication terminal device associated with the first communication terminal device.

[0015] According to the present invention, the function modification information indicating the modification of the communication functions of the first communication terminal device is transmitted to the second communication terminal device associated with the first communication terminal device, in accordance with the modification of the communication functions retained by the first communication terminal device, whereby the second communication terminal device can acquire the function modification information of the first communication terminal device. The user of the second communication terminal device can respond according to the content of the function modification of the first communication terminal device. As a result, it becomes feasible to implement efficient and smooth communication.

[0016] Furthermore, preferably, the communication system of the present invention further comprises a group information management server having group information storing means to store identification information of the second communication terminal device associated with the first communication terminal device, and group information transmitting/receiving means to transmit the identification information of the second communication terminal device to the terminal function management server, according to an inquiry from the terminal function management server; the processing determining means of the terminal function management server specifies the second communication terminal device, based on the identification information received from the group information management server, and transmits the function modification information to the second communication terminal device thus specified. This permits the group information management server to perform integrated management of the identification information of the second communication terminal device associated with each of the communication terminal devices, and thus facilitates modification and addition.

[0017] A communication method according to the present invention is a communication method executed in a communication system comprising a terminal function management server which stores a communication function retained by a communication terminal device, out of a plurality of communication functions to enable a plurality of communications of different communication modes, the communication method comprising: a terminal function storing step of storing one or more communication functions retained by each communication terminal device of a plurality of communication terminal devices, in correspondence to the communication terminal device; a terminal function modifying step of receiving communication function retention information transmitted from a first communication terminal device out of the plurality of communication terminal devices, and modifying the communication functions stored in correspondence to the first communication terminal device in terminal function storing means, based on the communication function retention information; and a function modification notifying step of transmitting function modification information indicating the modification of the communication functions of the first com-

munication terminal device to the second communication terminal device associated with the first communication terminal device.

[0018] According to the present invention, the function modification information indicating the modification of the communication functions of the first communication terminal device is transmitted to the second communication terminal device associated with the first communication terminal device, in accordance with the modification of the communication functions retained by the first communication terminal device, whereby the second communication terminal device can acquire the function modification information of the first communication terminal device. The user of the second communication terminal device can respond according to the content of the function modification of the first communication terminal device. As a result, it becomes feasible to implement efficient and smooth communication.

[0019] The present invention enables efficient and smooth communication.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] FIG. **1** is a drawing showing a functional configuration of a communication system according to a first embodiment of the present invention.

[0021] FIG. **2** is a drawing showing an example of a terminal state table stored in a terminal state storage unit according to the first embodiment.

[0022] FIG. **3** is a drawing showing an example of a group list table stored in a group list storage unit according to the first embodiment.

[0023] FIG. **4** is a drawing showing a hardware configuration of a terminal profile management server.

[0024] FIG. **5** is a drawing showing a hardware configuration of a first mobile terminal.

[0025] FIG. **6** is a sequence chart showing an operation sequence of the communication system according to the first embodiment.

[0026] FIG. **7** is a flowchart showing an operation procedure of a function modification information notifying process executed in the terminal profile management server according to the first embodiment.

[0027] FIG. **8** is a drawing showing an example of the terminal state table after updated.

[0028] FIG. **9** is a drawing showing an example of a group list table stored in a group list storage unit according to a second embodiment.

[0029] FIG. **10** is a sequence chart showing an operation sequence of a communication system according to the second embodiment.

[0030] FIG. **11** is a flowchart showing an operation procedure of a function modification information notifying process executed in a terminal profile management server according to the second embodiment.

[0031] FIG. **12** is a drawing showing a functional configuration of a communication system according to a third embodiment of the present invention.

[0032] FIG. **13** is a sequence chart showing an operation sequence of the communication system according to the third embodiment.

[0033] FIG. **14** is a flowchart showing an operation procedure of a function modification information notifying process executed in a terminal profile management server according to the third embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0034] The preferred embodiments of the communication system according to the present invention will be described below with reference to the drawings.

First Embodiment

[0035] FIG. **1** is a drawing showing a functional configuration of the communication system according to the first embodiment. The communication system **1**A is connected to a plurality of communication terminal devices via communication networks such as a fixed telephone network and a mobile telephone network, and makes connection of a communication line to a destination communication terminal device in accordance with a request for a communication such as a speech call or a packet communication from an originating communication terminal device. Each communication terminal device executes a communication control based on a software application retained thereby, to realize a predetermined communication function. Therefore, the communication function retained by each communication terminal device is determined based on the software application retained by the communication terminal device. When a communication terminal device retains a plurality of communication functions, it is able to use any one of the communication functions and thereby to perform a plurality of communications of different communication modes. If an originating communication terminal device and a destination communication terminal device both retain a predetermined communication function, it is feasible to perform a communication using the predetermined communication function between the two communication terminal devices. The communication functions include terminal functions such as the pictograph function and the PoC function, and communications of different communication modes are also implemented, for example, depending upon old and new versions in each function. In the description hereinafter, mobile terminals **2**A, **2**B, and **2**C such as cell phones or PHSs are exemplified as communication terminal devices.

[0036] The communication system **1**A has a terminal profile management server (terminal function management server) **3**A connected so as to enable transmission/reception of signals among first mobile terminal **2**A, second mobile terminal **2**B, and third mobile terminal **2**C via an exchange server (not shown) or the like, and a group list management server (group information storing means) **4**A connected so as to enable transmission/reception of signals to or from the terminal profile management server **3**A. Furthermore, the communication system **1**A has a DL (Down Load) server (download server) **5** which transmits a predetermined software application, i.e., data for allowing a terminal to retain a predetermined communication function, in response to a download request from the mobile terminal **2**A, **2**B, or **2**C to the mobile terminal **2**A, **2**B, or **2**C having sent the download request.

[0037] The terminal profile management server **3**A has a terminal state storage unit (terminal function storing means) **31** storing retained functions and retainable functions of the

first to third mobile terminals **2**A, **2**B, and **2**C. As shown in FIG. **2**, the terminal state storage unit **31** stores a terminal state table in which the retained functions and retainable functions are set in correspondence to subscriber identifiers being identification information of respective users using the first to third mobile terminals **2**A, **2**B, and **2**C and terminal identifiers being individual identification information of the first to third mobile terminals **2**A, **2**B, and **2**C. In the terminal state table, data indicating "present" is set if a mobile terminal can retain a predetermined communication function and actually retains it; data indicating "absent" is set if a mobile terminal can retain a predetermined communication function but does not retain it; data indicating "unavailable" is set if a mobile terminal cannot be loaded with or cannot retain a predetermined communication function in terms of its performance as hardware.

[0038] In the state shown in FIG. **2**, for example, the subscriber identifier of the user of the mobile terminal **2**A is "subscriber #A" and the terminal identifier of the mobile terminal **2**A is "MS#**1**." In correspondence to the subscriber identifier and the terminal identifier of mobile terminal **2**A, "absent," not "unavailable," is set in pictograph I function and pictograph II function. Therefore, it is indicated that the mobile terminal **2**A can retain the pictograph I function and pictograph II function but does not retain them. In addition, the subscriber identifier of the user of the mobile terminal **2**B is "subscriber #B" and the terminal identifier of mobile terminal **2**B is "MS#**2**." In correspondence to the subscriber identifier and terminal identifier of the mobile terminal **2**B, "absent," not "unavailable," is set in the pictograph II function and "present" is set in the pictograph I function. Therefore, it is indicated that the retained function of mobile terminal **2**B is only the pictograph I function and it can retain the pictograph II function. Furthermore, the subscriber identifier of the mobile terminal **2**C is "subscriber #C" and the terminal identifier is "MS#**3**." In correspondence to the subscriber identifier and terminal identifier of the third mobile terminal **2**C, "unavailable" is set in the pictograph II function and "absent" is set in the pictograph I function. Therefore, it is indicated that the mobile terminal **2**C cannot retain the pictograph II function and can retain the pictograph I function though it does not retain it.

[0039] As shown in FIG. **1**, the terminal profile management server **3**A has a determination logic storage unit **32**, a processing determining unit (determining means) **33**, a server-side information transceiver unit (terminal management information transmitting/receiving means) **34**, a notification target information transceiver unit **35**, and a DL (Down Load) instructing unit **36**.

[0040] The determination logic storage unit **32** stores a program showing a determination logic executed by the processing determining unit **33**. The processing determining unit (determining means) **33** retrieves the program stored in the determination logic storage unit **32** and executes the following processing in accordance with the program.

[0041] The processing determining unit (determining means) **33** receives terminal information (communication function retention information) on a regular or optional basis from each mobile terminal **2**A, **2**B, or **2**C via the server-side information transceiver unit **34** and, based on the received terminal information, it generates a new record in the terminal state table of the terminal state storage unit **31** or updates the record as to the retained functions and retainable communication functions in the respective mobile terminals **2**A, **2**B, and **2**C. The processing determining unit **33** updates the record of the terminal state table to modify the retained functions of the respective mobile terminals **2**A, **2**B, and **2**C stored in the terminal state storage unit **31**.

[0042] The terminal information contains a service identifier in addition to the subscriber identifier and terminal identifier. The service identifier is information to specify a communication function retained by each mobile terminal **2**A, **2**B, or **2**C and, for example, the terminal information transmitted from the mobile terminal **2**A contains all service identifiers corresponding to communication functions retained by the mobile terminal **2**A. The service identifier in the terminal information may be only a difference from that in preceding transmission; e.g., if a new communication function is added, the terminal information may contain only a service identifier corresponding to the new communication function.

[0043] For example, in a case where the processing determining unit **33** receives the terminal information containing neither of the service identifiers of the pictograph I function and pictograph II function from the mobile terminal **2**A, it generates such a record that the data indicating "absent" is set in both of the pictograph I function and pictograph II function (cf. FIG. **2**). Thereafter, where the processing determining unit **33** receives the terminal information containing the service identifier of the pictograph II function from the mobile terminal **2**A, it updates the record so that the data indicating "present" is set in the pictograph II function (cf. FIG. **8**). When there is a difference of service identifier between the terminal information received last time and the terminal information received this time as described above, the processing determining unit **33** determines that there was a modification of the communication functions in the mobile terminal **2**A, **2**B, or **2**C with the difference and executes an update of the record on the basis of the service identifiers contained in the terminal information received this time.

[0044] Particularly, where the latest terminal information contains a new service identifier absent in the preceding terminal information, the processing determining unit **33** determines that a new communication function corresponding to the new service identifier was added. Furthermore, the processing determining unit **33** updates the record so that the data indicating "present" is set in the new communication function, in correspondence to the subscriber identifier and terminal identifier of the mobile terminal **2**A, **2**B, or **2**C in which the new communication function was added (cf. FIG. **8**). The addition of the new communication function does not include only the simple addition without deletion of any other communication function, but also includes replacement by an upgrade of a communication function or the like. The modification of communication functions is not limited to only these additions of the communication function but also includes deletion of a communication function previously retained.

[0045] Furthermore, the processing determining unit **33** sends an inquiry through the notification target information transceiver unit **35** to the group list management server **4**A to specify a notification target of function modification information, e.g., the second mobile terminal **2**B and third mobile terminal **2**C. Then the processing determining unit **33** refers to the terminal state table stored in the terminal state storage unit **31** to determine whether the second mobile terminal **2**B and the third mobile terminal **2**C as notification targets can be loaded with the new communication function of the first mobile terminal **2**A, e.g., the pictograph II function, i.e., to

determine whether they can retain the new communication function, and further to determine whether the second mobile terminal **2**B determined as one capable of retaining the new communication function has already been loaded with the pictograph II function, i.e., whether the second mobile terminal **2**B retains the pictograph II function or not.

[0046] Furthermore, the processing determining unit **33** transmits the function modification information through the server-side information transceiver unit **34** to the second mobile terminal **2**B and the third mobile terminal **2**C being the notification targets. Namely, the processing determining unit **33** notifies the server-side information transceiver unit **34** of the subscriber identifiers and terminal identifiers of the second mobile terminal **2**B and the third mobile terminal **2**C being the notification targets, and transmits the function modification information via the server-side information transceiver unit **34** thereto.

[0047] Furthermore, the processing determining unit **33** notifies the DL instructing unit **36** of the subscriber identifier and terminal identifier of the second mobile terminal **2**B which can retain the pictograph II function and which does not retain it, out of the second mobile terminal **2**B and the third mobile terminal **2**C being the notification targets, to transmit DL instruction information (download instruction information) to the second mobile terminal **2**B.

[0048] Furthermore, the processing determining unit **33** receives a terminal information notification policy (associated terminal information) transmitted from each mobile terminal **2**A, **2**B, or **2**C, from the server-side information transceiver unit **34** and notifies the notification target information transceiver unit **35** of it. The terminal information notification policy according to the present embodiment contains the subscriber identifier, terminal identifier, and notification target subscriber identifier of each mobile terminal **2**A, **2**B, or **2**C being the transmitter of the terminal information notification policy.

[0049] The server-side information transceiver unit **34** receives the terminal information transmitted from each mobile terminal **2**A, **2**B, or **2**C and notifies the processing determining unit **33** of it. Furthermore, the server-side information transceiver unit **34** receives the terminal information notification policy transmitted from each mobile terminal **2**A, **2**B, or **2**C and notifies the processing determining unit **33** of it.

[0050] Furthermore, the server-side information transceiver unit **34**, when receiving the subscriber identifier and terminal identifier of the transmission target of the communication modification information from the processing determining unit **33**, inquires of an unrepresented location information management server as to locations of the mobile terminals **2**B and **2**C as the notification targets and transmits the function modification information indicating the modification of the communication functions of the first mobile terminal **2**A to the mobile terminal **2**B and/or **2**C the location of which has been confirmed. The function modification information contains the subscriber identifier and terminal identifier of the mobile terminal **2**A and the service identifier of the new communication function acquired by the mobile terminal **2**A. Furthermore, the function modification information contains a terminal state identifier indicating a terminal state of each mobile terminal **2**B or **2**C of the notification target, e.g., an identifier indicating whether the mobile terminal can retain the new function of the first mobile terminal **2**A, or whether the mobile terminal has been loaded therewith.

[0051] The DL instructing unit **36** inquires of the unrepresented location information management server, based on the subscriber identifier and terminal identifier notified of by the processing determining unit **33**, to confirm the location of the mobile terminal **2**B as a download instruction target, and transmits the DL instruction information of the new communication function, e.g., the pictograph II function to the mobile terminal **2**B the location of which has been confirmed. The DL instruction information contains a service identifier about the new communication function for instruction of a download of the new communication function.

[0052] The third mobile terminal **2**C, which cannot retain the added function of the first mobile terminal **2**A, receives the function modification information according to a first pattern and its output unit such as a display outputs a message, e.g., "Subscriber A added Pictograph II function. Unfortunately, Pictograph II function is unavailable for your cell phone. You are recommended to replace your phone with another." to inform the user of the fact. The second mobile terminal **2**B, which can retain the added function of the first mobile terminal **2**A and which does not retain the added function, receives both of the function modification information and the DL instruction information according to a second pattern and its output unit **26** outputs a message to urge a download of the pictograph II function, e.g., "Subscriber A added Pictograph II function. Do you want to add Pictograph II function, too?" to inform the user of the fact. A communication terminal device which already retains the added function of the first mobile terminal **2**A, receives only the function modification information according to a third pattern and its output unit outputs a message, e.g., "Subscriber A added Pictograph II function. You are now ready for communication with Subscriber A through Pictograph II function."

[0053] The notification target information transceiver unit **35** receives the terminal information notification policy from the processing determining unit **33** and transmits the terminal information notification policy to the group list management server **4**A. Furthermore, the notification target information transceiver unit **35** receives an inquiry about a notification target from the processing determining unit **33** and transmits information related to the inquiry, i.e., notification target search request information containing the subscriber identifier of the first mobile terminal **2**A subjected to the function modification, to the group list management server **4**A. Furthermore, the notification target information transceiver unit **35** receives notification target search response information from the group list management server **4**A and notifies the processing determining unit **33** of the notification target search response information. The notification target search response information contains the subscriber identifiers and terminal identifiers of the mobile terminal **2**B and the mobile terminal **2**C of the notification targets.

[0054] FIG. **4** is a drawing showing a hardware configuration of the terminal profile management server **3**A. As shown in FIG. **4**, the terminal profile management server **3**A is physically constructed with a CPU **301**, a ROM **302**, a RAM **303**, an input device **304**, an output device **305**, a communication module **306** being a data transmitting/receiving device, an auxiliary storage device **307**, and so on. Each function of the terminal profile management server **3**A is implemented by retrieving a predetermined software application onto the hardware device such as the CPU **301** and RAM **303**, operating the communication module **306**, input device **304**, and output device **305** under control of the CPU **301**, and reading

and writing data from and into the RAM **303**. The below-described group list management server **4**A and DL server **5** also have elements similar to those in the above-described hardware configuration and each of functions described below is implemented by these elements.

[0055] The group list management server **4**A has a group list storage unit **41**A, a group list control unit **42**, and a group information transceiver unit **43**. The group information transceiver unit **43** receives the terminal information notification policy and the notification target search request information from the notification target information transceiver unit **35** of the terminal profile management server **3**A and notifies the group list control unit **42** of the received information. It also receives the notification target search response information from the group list control unit **42** and transmits it to the notification target information transceiver unit **35**.

[0056] The group list storage unit **41**A stores a group list table and in the group list table, a notification target subscriber identifier is stored in association with each subscriber identifier. The notification target subscriber identifier is information to specify a notification target to be notified of the function modification information, with modification of the communication functions in the mobile terminals **2**A, **2**B, and **2**C. For example, as shown in FIG. **3**, notification target subscriber identifiers "subscriber #B" and "subscriber #C" are stored in association with subscriber identifier "subscriber #A" of user A. It indicates that in the case where there is a modification of the retained functions of the first mobile terminal **2**A used by user A, the notification targets of the function modification information are the second mobile terminal **2**B and the third mobile terminal **2**C used by user B or by user C. Similarly, "subscriber #A" and "subscriber #C" are stored in association with subscriber identifier "subscriber #B," which indicates that the function modification information is to be notified to user A or to user C with modification of the communication functions of the second mobile terminal **2**A of user B; "subscriber #B" is stored in association with subscriber identifier "subscriber #C," which indicates that the function modification information is to be notified to user B with modification of the communication functions of the third mobile terminal **2**C of user C.

[0057] The group list control unit **42** receives the terminal information notification policy through the group information transceiver unit **43** and generates a new record in the group list table stored in the group list storage unit **41**A or updates the group list table, based on the terminal information notification policy. For example, the terminal information notification policy from the first mobile terminal **2**A contains the subscriber identifier "subscriber #A." In a case where the terminal information notification policy contains "subscriber #B" and "subscriber #C" as notification target subscriber identifiers, "subscriber #B" and "subscriber #C" are associated as notification target subscriber identifiers of "subscriber #A" to generate a new record or update the old record.

[0058] The group list control unit **42**, when receiving the notification target search request information through the group information transceiver unit **43**, sets a subscriber identifier contained in the notification target search request information, to a search key and refers to the group list table to extract a notification target subscriber identifier, based thereon. Furthermore, the group list control unit **42** transmits the notification target search response information containing the extracted notification target subscriber identifier, through the group information transceiver unit **43** to the notification target information transceiver unit **35** of the terminal profile management server **3**A.

[0059] The group information transceiver unit **43** receives the terminal information notification policy and the notification target search request information transmitted from the terminal profile management server **3**A and notifies the group list control unit **42** of the received information. Furthermore, the group information transceiver unit **43** transmits the notification target search response information notified of by the group list control unit **42**, to the terminal profile management server **3**A.

[0060] The first mobile terminal **2**A has a terminal state management unit **21**, a DL control unit **24**, a manipulation receiving unit **25**, and an output unit **26**.

[0061] The terminal state management unit **21** has a terminal-side information transceiver unit **22** and a control unit **23**. The terminal-side information transceiver unit **22** transmits the terminal information and the terminal information notification policy to the terminal profile management server **3**A. Furthermore, the terminal-side information transceiver unit **22** receives the function modification information transmitted from the terminal profile management server **3**A. The control unit **23** executes control of operations of the terminal-side information transceiver unit **22**, DL control unit **24**, and output unit **26**, based on a user's input manipulation received by the manipulation receiving unit **25**. Particularly, the control unit **23** specifies a user as a notification target of the function modification information, based on the input manipulation, and generates the terminal information notification policy containing the subscriber identifier of each notification target user. Furthermore, the control unit **23** makes the output unit **26** output a function modification notification message, based on the function modification information received by the terminal-side information transceiver unit **22**.

[0062] The DL server **5** has a software storage unit **51** storing program data about a predetermined communication function, and a DL control unit **52** to transmit program data according to a download request from each mobile terminal **2**A, **2**B, or **2**C in response to the mobile terminal **2**A, **2**B, or **2**C. The download request contains a service identifier and the software storage unit **51** stores the program data about the communication function in correspondence to each service identifier. When the DL control unit **52** receives, for example, a download request for the pictograph II function from the first mobile terminal **2**A, it extracts the program data according to the service identifier contained in the download request, from the software storage unit **51** and transmits the extracted program data to the first mobile terminal **2**A, in order to make the first mobile terminal **2**A retain the pictograph II function.

[0063] The manipulation receiving unit **23** receives a manipulation input given by the user and, for example, when receiving a user's manipulation for a download of a predetermined communication function, the manipulation receiving unit **25** notifies the control unit **23** of predetermined information for executing the download. The output unit **26** executes an operation process according to an instruction from the control unit **23** to output a predetermined message. The DL control unit **24** executes an operation process according to an instruction from the control unit **23** to transmit the DL instruction information containing the service identifier of the predetermined communication function, to the DL server **5**. The

second and third mobile terminals **2**B and **2**C have the functional configuration similar to that of the first mobile terminal **2**A.

[0064] FIG. **5** is a drawing showing a hardware configuration of the first mobile terminal **2**A. As shown in FIG. **5**, the mobile terminal **2**A is physically constructed with a CPU **201**, a ROM **202**, a RAM **203**, an input device **204**, an output device **205**, a communication module **206** being a data transmitting/receiving device, an auxiliary storage device **207**, a UIM slot **208**, and a power unit **209**. Each of the functions of the mobile terminal **2**A is implemented by retrieving a predetermined software application onto the hardware such as the CPU **201** and RAM **203**, operating the communication module **206**, input device **204**, and output device **205** under control of the CPU **201**, and reading and writing data from and into the RAM **203**. The second and third mobile terminals **2**B and **2**C have a hardware configuration similar to that of the first mobile terminal **2**A and each of the functions of the second and third mobile terminals **2**B and **2**C is implemented by these elements.

Communication Method

[0065] Next, a communication method executed in the communication system **1**A will be described. FIG. **6** is a sequence chart showing an operation sequence executed in the communication system **1**A. In the description below, the operation sequence will be specifically explained with an example wherein there is a modification of the retained functions of the first mobile terminal **2**A and wherein the function modification information is notified to the second and third mobile terminals **2**B and **2**C.

[0066] As shown in FIG. **6**, the first to third mobile terminals **2**A, **2**B, and **2**C each notify the group list management server **4**A of the terminal information notification policy, based on their respective user's manipulations, through the terminal profile management server **3**A. The terminal information notification policy contains one or more notification target subscriber identifiers. For example, the terminal information notification policy from the first mobile terminal **2**A contains "subscriber #B" and "subscriber #C" corresponding to user B and user C as notification target subscriber identifiers. The group list control unit **42** of the group list management server **4**A, receiving the terminal information notification policy, updates the group list table stored in the group list storage unit **41**A.

[0067] The first to third mobile terminals **2**A, **2**B, and **2**C each notify the terminal profile management server **3**A of the terminal information at a predetermined period or optional timing. The terminal information contains a service identifier indicating a retained function, in addition to the subscriber identifier and the terminal identifier. In the terminal profile management server **3**A receiving the terminal information, the processing determining unit **33** executes registration and update of the terminal state management table stored in the terminal state storage unit **31** (terminal function storing step and terminal function modifying step).

[0068] For example, the first mobile terminal **2**A requests the DL server **5** to send data for retention of the pictograph II function as a new function and, after completion of a download about the pictograph II function, it notifies the terminal profile management server **3**A of the terminal information containing the service identifier of the pictograph II function. In the terminal state management table shown in FIG. **2**, "absent" has been set in both of the pictograph II function and the pictograph I function as the retained functions of the first mobile terminal **2**A. In this case, where the service identifier of the pictograph II function is contained in the terminal information from the first mobile terminal **2**A, the processing determining unit **33** executes an update process of modifying the retained functions of the first mobile terminal **2**A to the pictograph II function "present" (cf. FIG. **8**).

[0069] Next, the processing determining unit **33** of the terminal profile management server **3**A instructs the notification target information transceiver unit **35** to transmit the notification target search request to the group list management server **4**A. The group list control unit **42** of the group list management server **4**A, receiving the notification target search request, searches the group list table of the group list storage unit **41**A to extract the notification target subscriber identifier corresponding to the first mobile terminal **2**A, or user A, and then transmits the notification target search response containing the extracted notification target subscriber identifier, to the terminal profile management server **3**A.

[0070] The following will describe a function modification information notifying process executed in the terminal profile management server **3**A receiving the notification target search response. FIG. **7** is a flowchart showing an operation procedure of the function modification information notifying process executed in the terminal profile management server **3**A.

[0071] The processing determining unit **33** of the terminal profile management server **3**A notifies the group list management server **4**A of the notification target search request and thereafter stands by to receive the notification target search response (step S**1**). When the processing determining unit **33** receives the notification target search response, it determines whether the second and third mobile terminals **2**B, **2**C of notification targets can retain the pictograph II function being the added function (step S**2**). When the processing determining unit **33** determines that the third mobile terminal **2**C cannot retain the pictograph II function, it notifies the third mobile terminal **2**C of the function modification information according to the first pattern (step S**6**). The function modification information in this case is information for letting the third mobile terminal **2**C output a message to suggest replacement of the terminal with another terminal capable of retaining the pictograph II function. For example, in the case of the third mobile terminal **2**C, the function modification information is information for letting the second mobile terminal **2**B output the function modification notification message of "Subscriber A added Pictograph II function. Unfortunately, Pictograph II function is unavailable for your cell phone. You are recommended to replace your phone with another."

[0072] When the processing determining unit **33** determines that the second mobile terminal **2**B can retain the pictograph II function, it determines whether the second mobile terminal **2**B has already been loaded with the pictograph II function, i.e., whether it already retains the function (step S**4**). When the processing determining unit **33** determines that the second mobile terminal **2**B is not loaded with the pictograph II function, it transmits the function modification information according to the second pattern and the download instruction information of the added function to the second mobile terminal **2**B. The function modification information according to the second pattern is, for example, information for letting the second mobile terminal **2**B output the function modification notification message of "Subscriber A

added Pictograph II function." The download instruction information is, for example, information for letting the second mobile terminal **2**B output the DL instruction message of "Do you want to add Pictograph II function, too?"

[0073] When there is a communication terminal device determined to be able to retain the pictograph II function newly retained by the first mobile terminal **2**A and to be already loaded with the pictograph II function, among the communication terminal devices of notification targets, the processing determining unit **33** transmits the function modification information according to the third pattern to the communication terminal device. The function modification information according to the third pattern is, for example, information for letting the second mobile terminal **2**B output the function modification notification message of "Subscriber A added Pictograph II function. You are now ready for communication with Subscriber A through Pictograph II function." The step S**4**, step S**5**, and step S**6** correspond to the function modification notifying step.

[0074] As shown in FIG. **6**, the third mobile terminal **2**C, receiving the function modification information, outputs the function modification notification message from the output unit. The second mobile terminal **2**B, receiving the function modification information and DL instruction information, outputs the function modification notification message and the DL instruction message from the output unit **26**.

[0075] The user of the second mobile terminal **2**B gives, for example, a manipulation input to download the pictograph II function being the new function. Then the DL control unit **24** performs the download request to the DL server **5** to acquire data for retention of the pictograph II function from the DL server **5**. After the download of the pictograph II function, the second mobile terminal **2**B notifies the terminal profile management server **3**A of the terminal information containing the service identifier of the pictograph II function. The terminal profile management server **3**A, receiving the terminal information containing the service identifier of the pictograph II function from the second mobile terminal **2**B, updates the terminal state management table stored in the terminal state storage unit **31**. Furthermore, the terminal profile management server **3**A transmits a download completion notification of the pictograph II function in the second mobile terminal **2**B, to the first mobile terminal **2**A. The first mobile terminal **2**A outputs a download completion message of the second mobile terminal **2**B. The download completion message is, for example, a message of "Subscriber B completed download of Pictograph II function. You are now ready for communication with Subscriber B through Pictograph II function."

[0076] In the present embodiment, the terminal profile management server **3**A manages the communication functions retained by the respective mobile terminals **2**A-**2**C and if there is a modification of the communication functions retained by the first mobile terminal **2**A, the retained functions stored in correspondence to the subscriber identifier "subscriber #A" of the first mobile terminal **2**A in the terminal state storage unit **31** are modified based on the terminal information transmitted from the first mobile terminal **2**A. Furthermore, in accordance with the modification of the communication functions retained by the first mobile terminal **2**A, the processing determining unit **33** transmits the function modification information indicating the modification of the communication functions of the first mobile terminal **2**A, to the second and third mobile terminals **2**B, **2**C associated with the first mobile terminal **2**A. The second and third mobile terminals **2**B, **2**C, receiving the function modification information of the first mobile terminal **2**A, outputs a predetermined message. The users of the second and third mobile terminals **2**B, **2**C can optionally acquire the newly added communication function, for example, by downloading the pictograph II function from the DL server **5**, in accordance with the content of the function modification of the first mobile terminal **2**A. As a result, it becomes feasible to perform efficient and smooth communication.

[0077] Furthermore, since the communication subscriber identifiers of the other mobile terminals associated with each of the first to third mobile terminals **2**A-**2**C are stored in the group list storage unit **41** of the group list management server **4**A, the communication subscriber identifiers of the other mobile terminals associated with each of the first to third mobile terminals **2**A-**2**C can be managed in an integrated fashion and it facilitates modification and addition.

[0078] The terminal state storage unit **31** stores the communication functions which the first to third mobile terminals **2**A-**2**C can retain, by setting "present" if it is retained and "absent" if it is not retained, and stores unavailable communication functions by setting "unavailable" therefor. When the first mobile terminal **2**A comes to retain a new communication function, the processing determining unit **33** determines whether the associated terminal can retain the new communication function, for each of the second and third mobile terminals **2**B, **2**C associated with the first mobile terminal **2**A. When the associated terminal can retain the new communication function, the processing determining unit **33** transmits the DL instruction information of the new communication function to the retainable mobile terminal. If a mobile terminal associated with the first mobile terminal **2**A cannot retain the new communication function, it is substantially worthless to transmit the DL instruction information. Since the DL instruction information is transmitted only in the retainable case, the mobile terminal receiving the DL instruction information can efficiently acquire the new communication function.

[0079] Furthermore, the processing determining unit **33** performs the determination on whether the second mobile terminal **2**B capable of retaining the new communication function already retains the new communication function, and transmits the DL instruction information of the new communication function to the second mobile terminal **2**B only in the unretained case. Since the second mobile terminal **2**B acquires the DL instruction information of the new communication function not retained thereby, it becomes easier for the second mobile terminal **2**B to acquire the new communication function corresponding to the added function in the first mobile terminal **2**A. Particularly, the processing determining unit **33** determines whether the mobile terminal already retains the new communication function, only when the mobile terminal **2**B or **2**C associated with the first mobile terminal **2**A can retain the new communication function. As a result, the DL instruction information is not transmitted to the mobile terminal incapable of retaining the new communication function even if the mobile terminal does not retain the new communication function. This makes it feasible to effectively transmit the DL instruction information. In the present embodiment the processing determining unit **33** determines whether the associated terminal already retains the new communication function, after execution of the determination on whether the associated terminal can retain the new commu-

nication function, but the order of these determinations may be reverse, or only either one of the determinations may be adopted.

[0080] In the present embodiment, since the association of the other mobile terminals **2**B, **2**C is carried out based on the request for association, i.e., the terminal information notification policy from the first mobile terminal **2**A of the communication function modifying side, a user's intention of the first mobile terminal **2**A of the communication function modifying side is respected, which improves convenience for the user. Particularly, where a new communication function, e.g., the pictograph II function is newly added in the first mobile terminal **2**A and the pictograph II function is newly downloaded into the second mobile terminal **2**B, the DL completion information in the second mobile terminal **2**B is transmitted to the first mobile terminal **2**A. As a consequence, the user using the first mobile terminal **2**A can recognize that the user is now allowed to perform communication with the user of the second mobile terminal **2**B through the use of the pictograph II function.

[0081] The present embodiment was described above with the example in which there was the modification to add the new communication function in the first mobile terminal **2**A, but it can also be contemplated that the function modification information of the first mobile terminal **2**A is also transmitted to the other mobile terminals **2**B, **2**C with modification based on deletion of a communication function which the first mobile terminal **2**A has retained. In this case, each of the mobile terminals **2**B, **2**C receiving the function modification information outputs, for example, a function modification notification message of "Subscriber A deleted Pictograph II function. You are unable to perform communication with Subscriber A through Pictograph II function." to notify the user of the fact, and the users of the mobile terminals **2**B, **2**C receiving the function modification information can respond, e.g., so as to avoid the communication using the communication function deleted from the first mobile terminal **2**A, which enables efficient and smooth communication.

Second Embodiment

[0082] Next, the second embodiment of the present invention will be described with reference to FIGS. **9** to **11**. The communication system **1**B will be described using the same reference symbols in the drawings for the same or equivalent elements as those in the communication system **1**A of the first embodiment, without redundant description.

[0083] The communication system **1**B has the first to third mobile terminals **2**A, **2**B, and **2**C, a terminal profile management server (terminal function management server) **3**B, a group list management server (group information storing means) **4**B, and the DL (Down Load) server (download server) **5**.

[0084] The processing determining unit **33** of the terminal profile management server **3**B receives the terminal information notification policy (associated terminal information) transmitted from each mobile terminal **2**A, **2**B, or **2**C, from the server-side information transceiver unit **34** and notifies the group list management server **4**B of the terminal information notification policy through the notification target information transceiver unit **35**. The terminal information notification policy according to the present embodiment contains the subscriber identifier and monitored target subscriber identifier of each mobile terminal **2**A, **2**B, **2**C. The monitored target subscriber identifier is a subscriber identifier for specifying a target subscriber to be monitored as to the presence/absence of modification of retained functions.

[0085] The group list management server **4**B has a group list storage unit **41**B, the group list control unit **42**, and the group information transceiver unit **43**. The group information transceiver unit **43** receives the terminal information notification policy and the notification target search request information from the notification target information transceiver unit **35** of the terminal profile management server **3**B and notifies the group list control unit **42** of the received information. It also receives the notification target search response information from the group list control unit **42** and transmits it to the notification target information transceiver unit **35**.

[0086] The group list storage unit **41**B stores a group list table and in the group list table one or more monitored target subscriber identifiers are stored in association with each subscriber identifier. The notification target subscriber identifier of the first embodiment was the information for specifying the predetermined notification target to be notified of the function modification information, based on the terminal information notification policy from the terminal device subjected to the modification of the retained functions. However, the monitored target subscriber identifier, different from the notification target subscriber identifier, is information for specifying a communication terminal device as a monitored target, based on the terminal information notification policy from the communication terminal device which intends to monitor a modification of the retained functions. If there is a modification of the retained functions of the monitored target, the function modification information is transmitted to the communication terminal device requesting the monitoring.

[0087] For example, in the group list table, as shown in FIG. **9**, monitored target subscriber identifiers "subscriber #A" and "subscriber #C" are stored in association with the subscriber identifier "subscriber #B." Namely, an originator of the terminal information notification policy, i.e., an originator of the monitoring request is the second mobile terminal **2**B of "subscriber #B," and if there is a modification of the retained functions of the first mobile terminal **2**A or the third mobile terminal **2**C of "subscriber #A" or "subscriber #C," the function modification information is transmitted to the second mobile terminal **2**B.

Communication Method

[0088] Next, a communication method executed in the communication system **1**B will be described. FIG. **10** is a sequence chart showing an operation sequence executed in the communication system **1**B. As shown in FIG. **10**, the terminal information notification policy notified of by each of the first to third mobile terminals **2**A, **2**B, **2**C contains one or more monitored target subscriber identifiers. For example, the terminal information notification policy from the second mobile terminal **2**B contains "subscriber #A" and "subscriber #C" corresponding to user A and user C as monitored target subscriber identifiers. The group list control unit **42** of the group list management server **4**B, receiving the terminal information notification policy, updates the group list table stored in the group list storage unit **41**B.

[0089] Each of the first to third mobile terminals **2**A, **2**B, **2**C notifies the terminal profile management server **3**B of the terminal information at a predetermined period or optional timing. The terminal information contains a service identifier indicating the retained function, in addition to the subscriber identifier and terminal identifier. In the terminal profile man-

agement server **3**B receiving the terminal information, the processing determining unit **33** executes registration and update of the terminal state management table stored in the terminal state storage unit **31** (terminal function storing step and terminal function modifying step).

[0090] For example, when a new function is downloaded into the first mobile terminal **2**A, the processing determining unit **33** of the terminal profile management server **3**A transmits a notification target search request to the group list management server **4**B, in order to search for a terminal device whose monitored target is the first mobile terminal **2**A. The group list control unit **42** of the group list management server **4**B, receiving the notification target search request, searches the group list table of the group list storage unit **41**B and extracts the subscriber identifier of the second mobile terminal **2**B with which the subscriber identifier of the first mobile terminal **2**A, or user A is set as the monitored target subscriber identifier. Furthermore, the processing determining unit **33** transmits a notification target search response containing the extracted subscriber identifier to the terminal profile management server **3**A.

[0091] The following will describe a function modification information notifying process executed in the terminal profile management server **3**B receiving the notification target search response. FIG. **11** is a flowchart showing an operation procedure of the function modification information notifying process executed in the terminal profile management server **3**B.

[0092] When the pictograph II function is added in the first mobile terminal **2**A, the processing determining unit **33** of the terminal profile management server **3**B transmits the notification target search request for search for a user whose monitored target is the first mobile terminal **2**A, to the group list management server **4**B. After the transmission of the notification target search request, the processing determining unit **33** stands by to receive the notification target search response (step S**11**). When the processing determining unit **33** receives the notification target search response, it determines whether there is a terminal device whose monitored target is the first mobile terminal **2**A (step S**12**). If there is no terminal device whose monitored target is the first mobile terminal **2**A, the processing is terminated.

[0093] For example, where the second mobile terminal **2**B has a monitored target of the first mobile terminal **2**A, the processing determining unit **33** determines whether the second mobile terminal **2**B can retain the added function in the first mobile terminal **2**A, i.e., the pictograph II function (step S**13**). When the second mobile terminal **2**B is determined to be incapable of retaining it, the processing determining unit **33** transmits the function modification information according to the first pattern to the second mobile terminal **2**B (step S**17**). The function modification information according to the first pattern is the same as in the first embodiment.

[0094] When the processing determining unit **33** determines that the second mobile terminal **2**B can retain the pictograph II function, it then determines whether the second mobile terminal **2**B has already been loaded with the pictograph II function, i.e., whether the second mobile terminal **2**B already retains it (step S**14**). The processing determining unit **33** transmits the function modification information and DL instruction information according to the second pattern to the second mobile terminal **2**B if in an unloaded state (step S**16**), and transmits the function modification information according to the third pattern to the second mobile terminal **2**B if in a loaded state (step S**15**). The function modification information according to the second pattern and the third pattern is the same as in the first embodiment. The step S**15**, step S**16**, and step S**17** correspond to the function modification notifying step.

[0095] As shown in FIG. **10**, the second mobile terminal **2**B, receiving the function modification information and DL instruction information, outputs the DL instruction message from the output unit **26**. Since the first mobile terminal **2**A is not a monitored target of the third mobile terminal **2**C, the function modification information is not transmitted.

[0096] In the present embodiment, the terminal profile management server **3**B manages the communication functions retained by each of the mobile terminals **2**A-**2**C and if there is a modification of the communication functions retained by the first mobile terminal **2**A, the retained functions stored in correspondence to the subscriber identifier "subscriber #A" of the first mobile terminal **2**A in the terminal state storage unit **31** are modified based on the terminal information transmitted from the first mobile terminal **2**A. Furthermore, in accordance with the modification of the communication functions retained by the first mobile terminal **2**A, the processing determining unit **33** transmits the function modification information indicating the modification of the communication functions of the first mobile terminal **2**A, to the second and third mobile terminals **2**B, **2**C associated as monitored targets of the first mobile terminal **2**A. The second and third mobile terminals **2**B, **2**C, receiving the function modification information of the first mobile terminal **2**A, output a predetermined message. The users of the second and third mobile terminals **2**B, **2**C can optionally acquire the newly added communication function, e.g., the pictograph II function by downloading it from the DL server **5**, according to the content of the function modification of the first mobile terminal **2**A. As a result, it becomes feasible to perform efficient and smooth communication.

[0097] In the present embodiment, since the association with the other mobile terminal **2**A is carried out based on the request for association from the second or third mobile terminal **2**B, **2**C requesting monitoring of the first mobile terminal **2**A, i.e., based on the terminal information notification policy, a user's intention of the second or third mobile terminal **2**B, **2**C of the monitoring requesting side is respected, which improves the convenience for the user.

[0098] The present embodiment was described above with the example in which there was the modification to add the new communication function in the first mobile terminal **2**A, but it can also be contemplated that the function modification information of the first mobile terminal **2**A is also transmitted to the second and third mobile terminals **2**B, **2**C of the monitoring requesting sources, with modification based on deletion of the communication function which the first mobile terminal **2**A has retained. In this case, each of the mobile terminals **2**B, **2**C receiving the function modification information outputs, for example, a function modification notification message of "Subscriber A deleted Pictograph II function. You are unable to perform communication with Subscriber A through Pictograph II function." to notify the user of the fact, and thus the users of the mobile terminals **2**B, **2**C receiving the function modification information can respond, e.g., so as to avoid the communication using the

communication function deleted from the first mobile terminal **2**A, which enables efficient and smooth communication.

Third Embodiment

[0099] Next, the third embodiment of the present invention will be described with reference to FIGS. **12**, **13**, and **14**. The communication system **1**C will be explained with the same reference symbols in the drawings for the same or equivalent elements as those in the communication system **1**A of the first embodiment, without redundant description.

[0100] The communication system **1**C has a first mobile terminal **2**D and the second and third mobile terminals **2**B, **2**C, a terminal profile management server (terminal function management server) **3**C, and the DL (Down Load) server (download server) **5**. The communication system **1**C of the present embodiment is not provided with the group list management server **4**A or **4**B.

[0101] The first mobile terminal **2**D, different from the mobile terminal **2**A of the first embodiment, has a notification target storage unit **27**. The notification target storage unit **27** stores a notification target subscriber identifier for specifying a notification destination of function modification information. The control unit **23** of the mobile terminal **2**D executes registration and update of the notification target subscriber identifiers stored in the notification target storage unit **27**, based on an input manipulation received by the manipulation receiving unit **25**. Furthermore, the control unit **23** generates terminal information so as to contain one or more notification target subscriber identifiers stored in the notification target storage unit **27**, and transmits the generated terminal information to the terminal profile management server **3**C on a regular or optional basis.

[0102] The processing determining unit **33** of the terminal profile management server **3**C, receiving the terminal information, updates the terminal state management table of the terminal state storage unit **31**, based on the terminal information. Furthermore, when the processing determining unit **33** determines that a new function is added in the terminal device of the originator of the terminal information, e.g., the first mobile terminal **2**D, it extracts the notification target subscriber identifiers from the received terminal information and transmits the function modification information to the terminal devices specified by the extracted notification target subscriber identifiers, e.g., the second mobile terminal **2**B and the third mobile terminal **2**C.

Communication Method

[0103] Next, a communication method executed in the communication system **1**C will be described. FIG. **13** is a sequence chart showing an operation sequence executed in the communication system **1**C. As shown in FIG. **13**, the terminal information notified of by each of the first to third mobile terminals **2**A, **2**B, **2**C contains the subscriber identifier, terminal identifier, service identifier, and notification target subscriber identifier. The terminal profile management server **3**C updates the terminal state management table of the terminal state storage unit **31**, based on the received terminal information.

[0104] When a new function, e.g., the pictograph II function is downloaded into the first mobile terminal **4**D, the terminal profile management server **3**C receiving the terminal information from the first mobile terminal **4**D updates the terminal state management table of the terminal state storage unit **31**, based on the received terminal information.

[0105] Next, the processing determining unit **33** of the terminal profile management server **3**C executes the function modification information notifying process. FIG. **14** is a flowchart showing an operation procedure of the notification function modifying process. The processing determining unit **33** determines whether the new function was added in the first mobile terminal **2**D, based on the terminal information from the first mobile terminal **2**D (step S**21**). When it determines that no new function was added, the processing is terminated without execution of the subsequent processing.

[0106] When the processing determining unit **33** determines that a new function was added in the first mobile terminal **2**D, it determines whether a notification target subscriber identifier is contained in the terminal information from the first mobile terminal **2**D (step S**22**). When it is not contained, the processing is terminated without execution of the subsequent processing.

[0107] Next, the processing determining unit **33** extracts the notification target subscriber identifier contained in the terminal information from the first mobile terminal **2**D and, for example, specifies the second mobile terminal **2**B and the third mobile terminal **2**C. Furthermore, the processing determining unit **33** determines whether the specified mobile terminal can retain the added function, e.g., the pictograph II function, for each of the specified mobile terminals **2**B, **2**C (step S**23**). The processing determining unit **33** transmits the function modification information according to the first pattern to the mobile terminal **2**C incapable of retaining the added function, and executes the subsequent processing for the mobile terminal **2**B capable of retaining the added function. The function modification information according to the first pattern is the same as in the first embodiment.

[0108] Next, the processing determining unit **33** determines whether the second mobile terminal **2**B capable of retaining the pictograph II function has already been loaded with the pictograph II function, i.e., whether the second mobile terminal **2**B already retains it (step S**26**). When it is determined that the second mobile terminal **2**B is unloaded therewith, the processing determining unit **33** transmits the function modification information according to the second pattern and the DL instruction information to the second mobile terminal **2**B (step S**26**). When it is determined that the second mobile terminal **2**B has already been loaded with the added function, the processing determining unit **33** transmits the function modification information according to the third pattern. The function modification information according to the second and third patterns is the same as in the first embodiment. The step S**25**, step S**26**, and step S**27** correspond to the function modification notifying step.

[0109] As shown in FIG. **13**, the third mobile terminal **2**C, receiving the function modification information, outputs the function modification notification message from the output unit. The second mobile terminal **2**B, receiving the function modification information and DL instruction information, outputs the DL instruction message from the output unit **26**.

[0110] When the download of the pictograph II function is completed in the second mobile terminal **2**B, the second mobile terminal **2**B notifies the terminal profile management server **3**C of the terminal information containing the service identifier of the pictograph II function. The terminal profile management server **3**C, receiving the terminal information containing the service identifier of the pictograph II function

from the second mobile terminal **2**B, updates the terminal state management table stored in the terminal state storage unit **31**. Furthermore, the terminal profile management server **3**C transmits a download completion notification of the pictograph II function in the second mobile terminal **2**B to the first mobile terminal **2**D.

[0111] In the present embodiment, the terminal profile management server **3**C manages the communication functions retained by the respective mobile terminals **2**D, **2**B, **2**C and if there is a modification of the communication functions retained by the first mobile terminal **2**D, the retained functions stored in correspondence to the subscriber identifier "subscriber #A" of the first mobile terminal **2**D in the terminal state storage unit **31** are modified based on the terminal information transmitted from the first mobile terminal **2**D. Furthermore, the processing determining unit **33** specifies the second and third mobile terminals **2**B, **2**C associated with the first mobile terminal **2**D, based on the notification target subscriber identifiers contained in the terminal information, and, in accordance with the modification of the communication functions retained by the first mobile terminal **2**D, it transmits the function modification information indicating the modification of the communication functions of the first mobile terminal **2**A, to the mobile terminals **2**B, **2**C. The second and third mobile terminals **2**B, **2**C, receiving the function modification information of the first mobile terminal **2**A, output a predetermined message. The users of the second and third mobile terminals **2**B, **2**C can optionally acquire the newly added communication function, e.g. the pictograph II function by downloading it from the DL server **5**, according to the content of the function modification of the first mobile terminal **2**A. As a result, it becomes feasible to implement efficient and smooth communication.

[0112] The present invention is not limited to the above embodiments only. For example, in the first and second embodiments described above, the group list management server **4**A or **4**B was provided separately from the terminal profile management server (terminal function management server) **3**A or **3**B, and the association among the mobile terminals **2**A-**2**C was managed in the group list storage unit **41** of the group list management server **4**A, **4**B; however, it is also possible to adopt a configuration wherein the group list storage unit is provided in the terminal profile management server **3**A or **3**B.

[0113] In the above embodiments, the mobile terminal **2**B receiving the DL instruction information waits for a user's input manipulation, and with execution of the input manipulation for the DL request, the download request is transmitted to the DL server **5** to download the predetermined communication function; however, it is also possible to adopt a configuration wherein, without waiting for the user's input manipulation, the download request is immediately transmitted to the DL server **5** with reception of the DL instruction information to perform the download of the predetermined communication function.

What is claimed is:

1. A terminal function management server which stores a communication function retained by a communication terminal device, out of a plurality of communication functions to enable a plurality of communications of different communication modes,

said terminal function management server comprising:

terminal function storing unit to store one or more communication functions retained by each communication terminal device of the plurality of communication terminal devices, in correspondence to the communication terminal device; and

processing determining unit to receive communication function retention information transmitted from the communication terminal device and to modify the communication functions stored in the terminal function storing unit, based on the communication function retention information,

wherein the processing determining unit, when modifying the communication functions stored in correspondence to a first communication terminal device out of the plurality of communication terminal devices, in the terminal function storing unit, transmits function modification information indicating the modification of the communication functions of said first communication terminal device, to a second communication terminal device associated with the first communication terminal device.

2. The terminal function management server according to claim **1**, wherein the processing determining unit specifies the second communication terminal device, based on identification information acquired from group information storing unit storing the identification information of the second communication terminal device associated with the first terminal communication device, and transmits the function modification information to the second communication terminal device thus specified.

3. The terminal function management server according to claim **1**, wherein the communication function retention information contains identification information of the second communication terminal device associated with the first communication terminal device, and

wherein the processing determining unit specifies the second communication terminal device, based on the identification information contained in the communication function retention information, and transmits the function modification information to the second communication terminal device thus specified.

4. The terminal function management server according to claim **1**, wherein when the communication functions stored in the terminal function storing unit are modified by adding a new communication function in correspondence to the first communication terminal device, the processing determining unit determines whether the second communication terminal device retains the new communication function,

the terminal function management server further comprising download instructing unit to transmit download instruction information to instruct a download of the new communication function, to the second communication terminal device determined not to retain the new communication function, by the processing determining unit.

5. The terminal function management server according to claim **1**, wherein the terminal function storing unit further stores a communication function which the communication terminal device can retain, and

wherein when the communication functions stored in the terminal function storing unit are modified by adding a new communication function in correspondence to the first communication terminal device, the processing determining unit determines whether the second communication terminal device can retain the new communication function,

the terminal function management server further comprising download instructing unit to transmit download instruction information to instruct a download of the new communication function, to the second communication terminal device determined to be able to retain the new communication function, by the processing determining unit.

6. A communication system comprising a terminal function management server which stores a communication function retained by a communication terminal device, out of a plurality of communication functions to enable a plurality of communications of different communication modes,

wherein said terminal function management server comprises:

terminal function storing unit to store one or more communication functions retained by each communication terminal device of the plurality of communication terminal devices, in correspondence to the communication terminal device; and

processing determining unit to receive communication function retention information transmitted from the communication terminal device and to modify the communication functions stored in the terminal function storing unit, based on the communication function retention information,

wherein the processing determining unit, when modifying the communication functions stored in correspondence to a first communication terminal device out of the plurality of communication terminal devices, in the terminal function storing unit, transmits function modification information indicating the modification of the communication functions of said first communication terminal device, to a second communication terminal device associated with the first communication terminal device.

7. The communication system according to claim **6**, further comprising: a group information management server having group information storing unit to store identification information of the second communication terminal device associated with the first communication terminal device, and group information transmitting/receiving unit to transmit the identification information of the second communication terminal device to the terminal function management server, according to an inquiry from the terminal function management server,

wherein the processing determining unit of the terminal function management server specifies the second communication terminal device, based on the identification information received from the group information management server, and transmits the function modification information to the second communication terminal device thus specified.

8. A communication method executed in a communication system comprising a terminal function management server which stores a communication function retained by a communication terminal device, out of a plurality of communication functions to enable a plurality of communications of different communication modes,

the communication method comprising:

a terminal function storing step of storing one or more communication functions retained by each communication terminal device of a plurality of communication terminal devices, in correspondence to the communication terminal device;

a terminal function modifying step of receiving communication function retention information transmitted from a first communication terminal device out of the plurality of communication terminal devices, and modifying the communication functions stored in correspondence to the first communication terminal device in terminal function storing unit, based on the communication function retention information; and

a function modification notifying step of transmitting function modification information indicating the modification of the communication functions of the first communication terminal device to the second communication terminal device associated with the first communication terminal device.

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